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SAN FRANCISCO CITY PLANNING COMMISSION

DRAFT
ENVIRONMENTAL IMPACT REPORT

MISSION-EMBARCADERO
PARKING STRUCTURE

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Mission-Embarcadero
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LEIGHTON and ASSOCIATES

ENGINEERING, GEOLOGY
ENVIRONMENTAL SCIENCES, RESEARCH
AND GEOTECHNICAL PLANNING

620 Price Avenue, Redwood City, California 94063 Tel: (415) 364-7476

January 21, 1977

SUBJECT: DRAFT ENVIRONMENTAL IMPACT REPORT
PROPOSED MISSION-EMBARCADERO PARKING GARAGE

Gentlemen:

The enclosed document is transmitted to you as a party with potential interest in this matter.

A public hearing on this Draft Environmental Impact Report and other matters will be held on Thursday, February 24, 1977 at 2:30 pm in Room 282, City Hall.

At the same place immediately following the hearing, or at a continuation date announced by the Commission at the hearing, there will be a public hearing on the application for conditional use authorization for the subject project.

Sincerely yours,

LEIGHTON AND ASSOCIATES, INC.

Larry Seeman
Director of Environmental
Projects

Enclosure

I SUMMARY

The proposed project would be a seven-level parking structure for 475 automobiles, with 18,000 square feet of retail commercial space provided on the ground level. The project would be located east of the corner of Steuart and Mission Streets on the east side of Steuart between the Audiffred Building (Historic Landmark No. 7) and the YMCA. The purpose of the project would be to provide parking for visitors, customers and employees of commercial offices and businesses in the area; parking fee structure would emphasize short-term parking use. The project site is in the C-3-O Zoning District which requires a Conditional Use authorization for a parking garage. Portions of the site are occupied by a parking lot, a restaurant, two hotels, several bars and several commercial businesses. Portions of the buildings on the proposed site are vacant. The elevated Embarcadero Freeway passes the proposed site on its east side.

The proposed project would add additional traffic to surrounding streets and intersections, with concomitant increases in emissions from vehicles, but would not result in pollutant concentrations that would exceed federal or state ambient air quality standards in the vicinity of the project site. The project would contribute to degradation of the air quality conditions downwind of the site. The proposed project is compatible with proposed plans to demolish the Embarcadero Freeway. The proposed project would increase the need for community services and utilities at the site but would not exceed the ability of providers of these services to serve. The proposed project would have temporary disruptive impacts on present occupants and tenants of the project site. When completed, the proposed project would be exposed to a variety of geologic hazards including ground shaking, liquefaction and tsunami inundation. The project would require an annual operating subsidy of $271,000, taken from parking meter revenue.

Geologic hazards would be mitigated through adherance to recommendations of the geotechnical engineer employed by the project sponsor in conformity with the policies of the Community Safety section of the Comprehensive Plan of San Francisco. Noise generated during construction would be limited by the requirements of the San Francisco Noise Ordinance and limited to daytime hours. Relocation assistance for residents and tenants would be provided by the project sponsor. If artifacts of historical significance are found during construction, the contractor would halt construction until their significance could be determined and would accordingly take appropriate measures.

Alternatives would include a reduced or expanded scale parking structure, development of the proposed project at another location, no project, elimination of commercial use proposed for the ground floor, or use of the site for commercial or office use.

II PROJECT DESCRIPTION

The proposed project is a seven-level, 475-space parking structure with associated commercial space in downtown San Francisco, one building south of the corner of Mission Street and The Embarcadero.*

Project description data were obtained primarily from the project sponsor (San Francisco Central City Parking Corporation) or the sponsor's design consultant, De Leuw, Cather and Company.

LOCATION AND BOUNDARY

The proposed site is in Assessor's Block 3715 and includes all of lots 2 through 6, an area 229 feet long by 137.5 feet wide. The project site is located on the San Francisco North 7.5 minute USGS Quadrangle at approximately N 31° 47', W 122° 23' (Figure 1). For planning purposes, a 13 block study area, shown on Figure 2, was established by the project design consultant. Where applicable, this area has been adopted as the area of influence of the project for the purposes of this report.

LAND TENURE STATUS

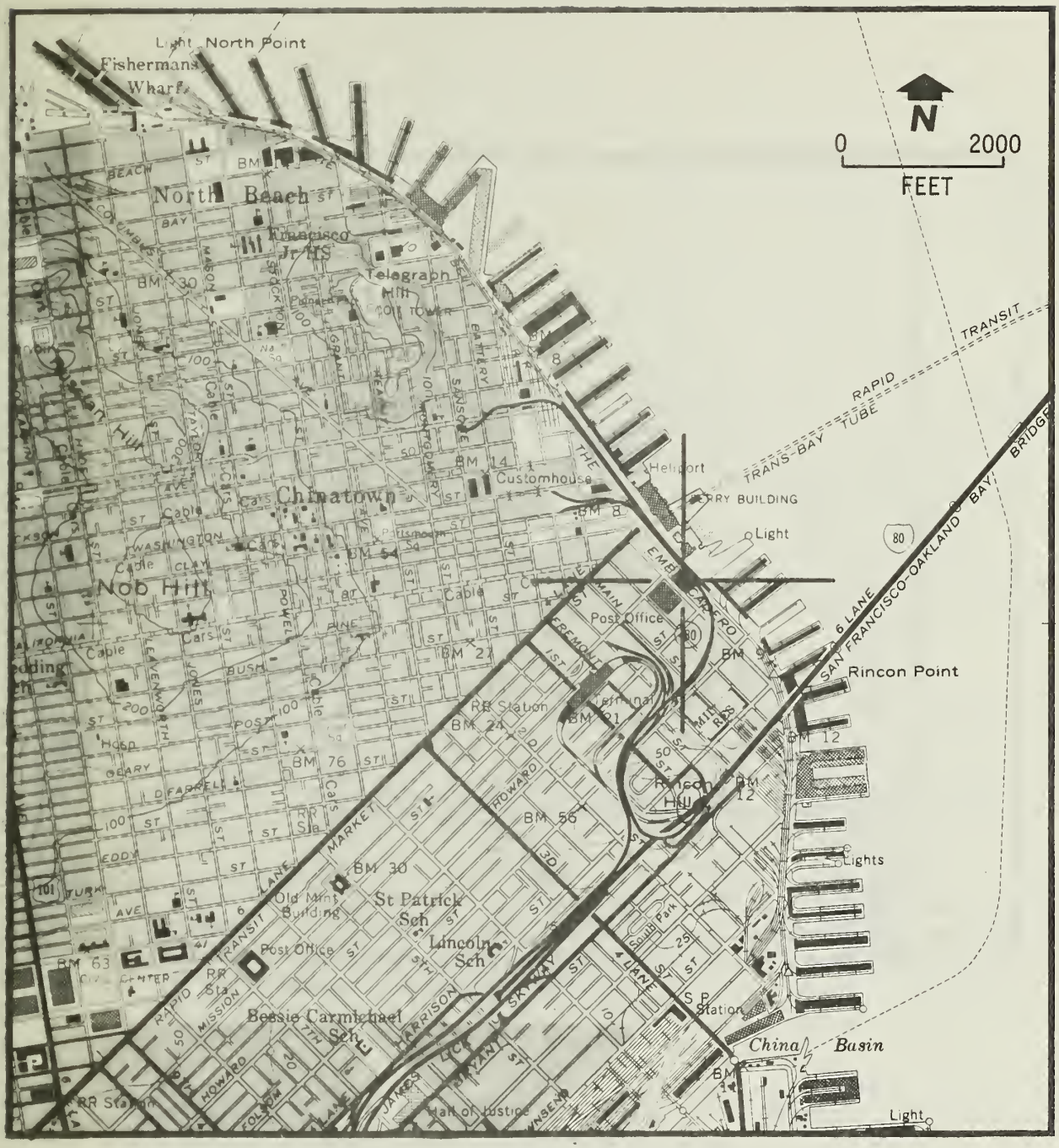
The project site is presently in four separate ownerships. The project sponsor is negotiating with the four owners with the objective of obtaining a purchase agreement conditioned on obtaining entitlement to construct the proposed structure. Lot 1 which fronts on Mission Street to the north of the project site is owned by one of the four owners of the project site and may be involved in the ultimate purchase agreement for the project site. Lot 1 is occupied by the Audiffred Building, Designated Landmark No. 7 (City of San Francisco, 1974), which would not be a part of the project.

OBJECTIVES

The objective of the proposed project would be to carry out the policies of the project sponsor with respect to provision of parking in the downtown San Francisco area. This objective is embodied within two policies of the parking authority as contained on page 2 of their 1974-1975 Annual Report: 1) stimulation of and cooperation with private enterprise to finance and construct the facilities

---

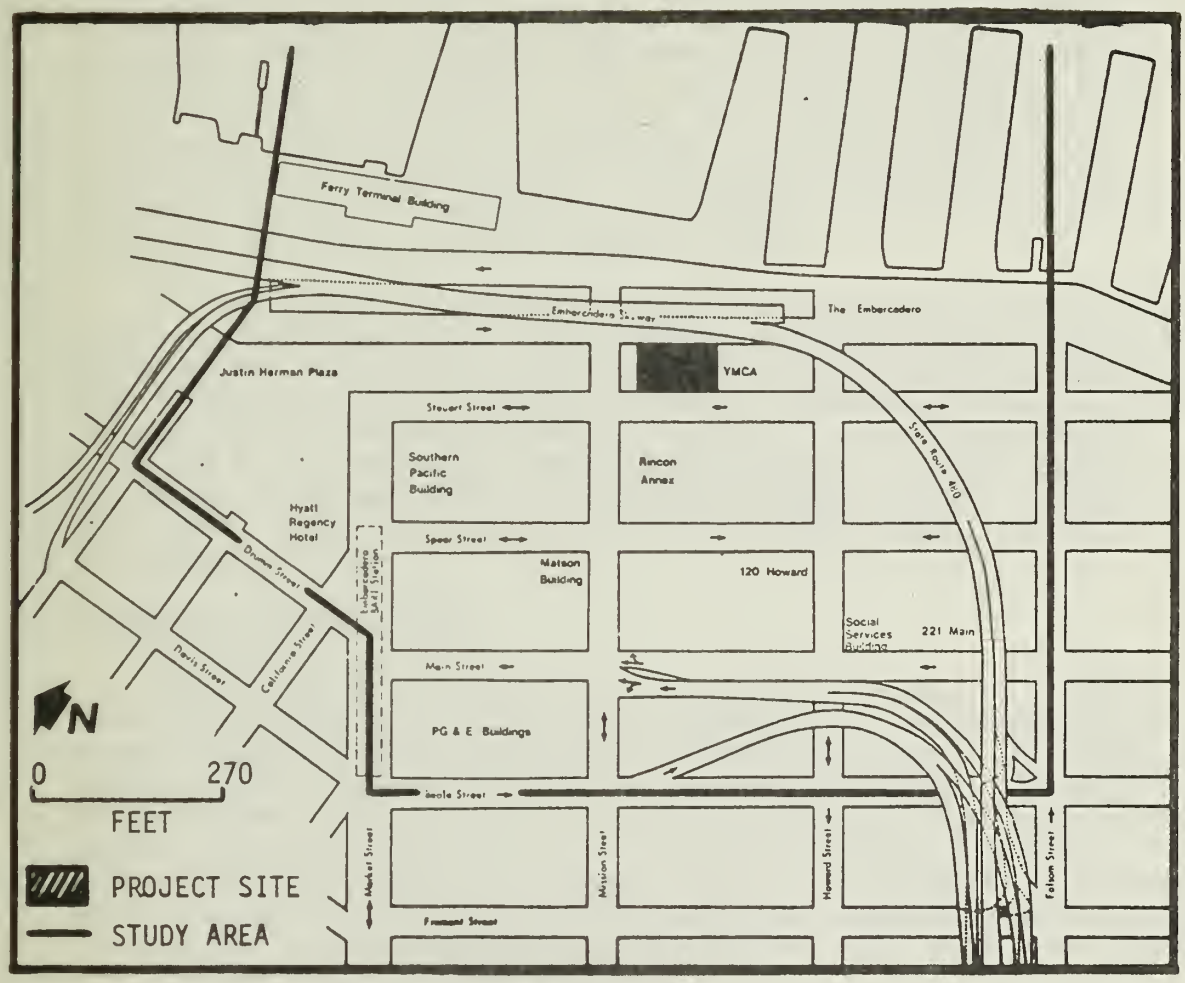
* Mission Street runs in a northeast-southwest direction and The Embarcadero runs northwest-southeast paralleling the waterfront. In keeping with custom, Mission Street will be considered to run east-west and The Embarcadero to run north-south in directional references contained in this report.



Source: San Francisco North, CA 7.5' USGS Quadrangle

FIGURE 1

MISSION-EMBARCADERO PARKING GARAGE PROJECT LOCATION



Source: De Leuw, Cather and Company (1975)

FIGURE 2

PROJECT SITE, VICINITY, AND STUDY AREA

required under the off-street parking program, and 2) public cooperation with private enterprise to provide off-street parking by public provision of garage sites and private provision of the construction financing (San Francisco Central City Parking Corporation, 1975).

The purpose of the project would be to provide 475 parking spaces on five parking levels and about 18,000 square feet of leasable commercial space on the street level. Parking facilities are proposed to provide short-term off-street parking opportunities in an area where off-street parking is primarily devoted to all-day parking at daily and monthly rates. Commercial space would also be provided as such multiple use is encouraged by city policy. The size of the proposed facility was established by the sponsor's design consultant by the size of the site, the height/bulk limitations of the City Planning Code and the level of parking space deficiency projected for the period 1976-1985 (De Leuw, Cather and Company, 1975).

If constructed, the proposed project would serve new office space recently constructed, under construction, or pending in the study area, including One Market Plaza, the proposed Howard/Main Building, the 221 Main Building and the 120 Howard Building. A complete listing of these and other major construction projects proposed in the study area is contained in the preliminary design report prepared for the project by the design consultant (De Leuw, Cather and Company, 1975). A copy of this report is on file with the City Planning Department, Office of Environmental Review.

TECHNICAL CHARACTERISTICS

Planning Code. The project site is located in the C-3-O (Downtown Office)Zoning District in which commercial use is permitted as a primary use and parking permitted as a conditional use.* It is also in an 84-E Height and Bulk District.** The proposed garage complies with the provisions of the Code by being no higher than 65 feet above street level, except for projections less than 110 feet long and 140 feet diagonal (De Leuw, Cather and Company, 1975). The Planning Code requires one off-street loading space for the amount of Commercial space proposed. In order not to provide such space, the project sponsor may seek a variance.

Structural and Support System Features. Basic floor plan and cross sectional features of the proposed structure are depicted in Figure 3.

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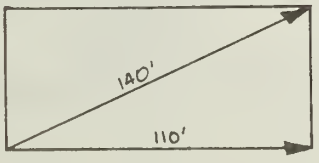
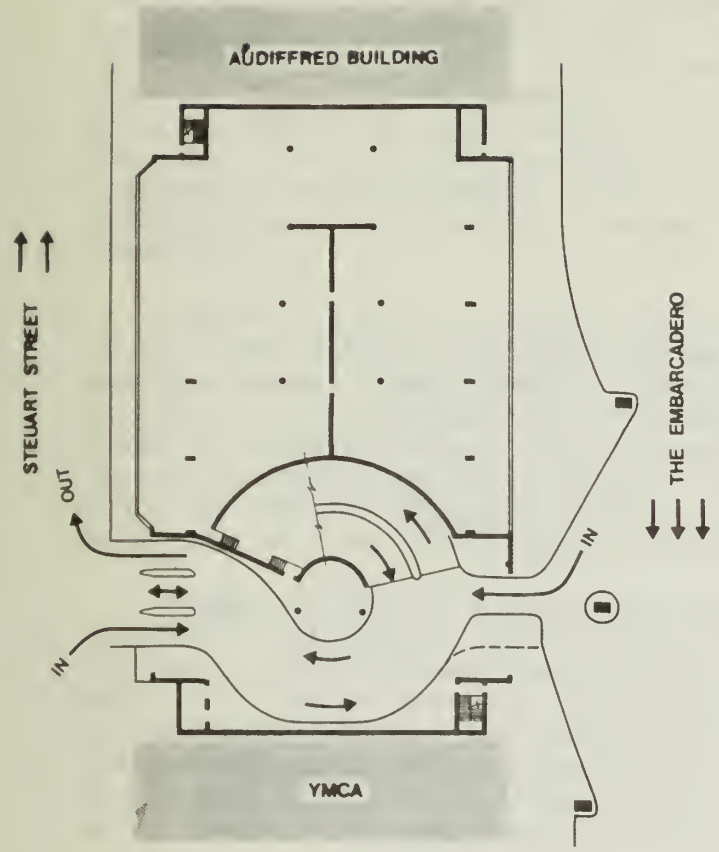
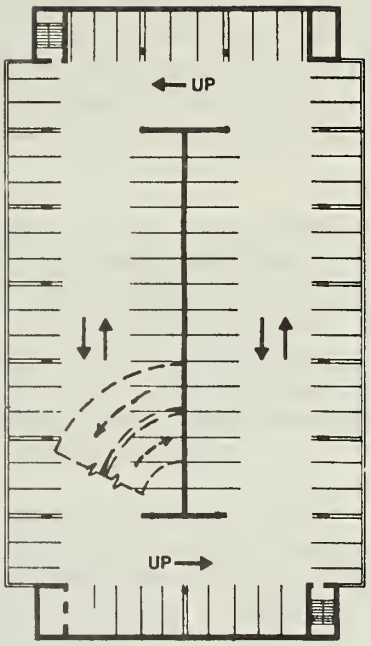
* A conditional use is one subject to Commission approval, which may be subject to certain stated conditions.

** An 84-E District is a district in which buildings rising above 65 feet in height are limited to a maximum plan dimension in feet as follows: length 110 feet, diagonal 140 feet.

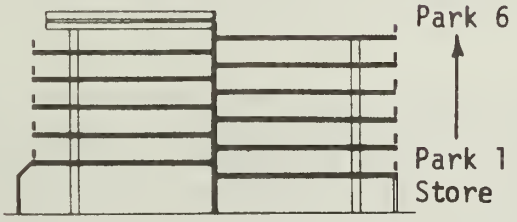




GROUND LEVEL



TYPICAL PARKING LEVEL*



CROSS SECTION AT CENTER OF GARAGE

*Except first parking level in which circular access ramp to and from street level would occur as shown by imaginary dashed lines. Striping shown is for normal sized automobiles; optional compact sized spaces would provide additional parking capacity.

FIGURE 3

PLAN AND SECTION VIEWS OF PROPOSED STRUCTURE

The building is proposed to be constructed of lightweight reinforced concrete cast-in-place waffle slabs. The building would be placed on The Embarcadero property line and would be set back about 5.5 feet from the Steuart Street property line. The foundation would be on long piles (estimated 140 feet) because of a deep layer of bay mud beneath the site. This site condition will be discussed further in the "Environmental Setting" Section of this report. Columns within the structure would be minimized by the use of long span slab construction techniques.

Spandrel* elevations along Steuart Street and The Embarcadero would be horizontal with ramping between parking levels achieved by means of gradual slopes along the center wall and steeper slopes along the party walls of the adjacent YMCA and Audiffred buildings where the slope is hidden from view. Energy requirements for the proposed structure would be met with electric power provided from a transformer beneath the sidewalk on Steuart Street. Telephone, water and sewer service would be taken from existing service in Steuart Street.

Commercial Space. Approximately 18,000 square feet of ground floor area which is not required for access, parking control, ramps, stairway or elevators would be available for commercial use.** Approximately 130 feet of commercial frontage would be provided along both Steuart Street and The Embarcadero (total 260 feet). The depth of commercial space would be approximately 64 feet along The Embarcadero and 70 feet along Steuart Street. Approximately 45-60 persons would be employed in the shops that occupy the commercial space.

Parking Garage Features. Garage access and egress would take place primarily at a Steuart Street entrance/exit. An entrance also would be provided from The Embarcadero for southbound vehicles only. If, in the future, The Embarcadero becomes a limited access road, this entrance would be closed; the single entrance/exit at Steuart Street would serve the entire garage.

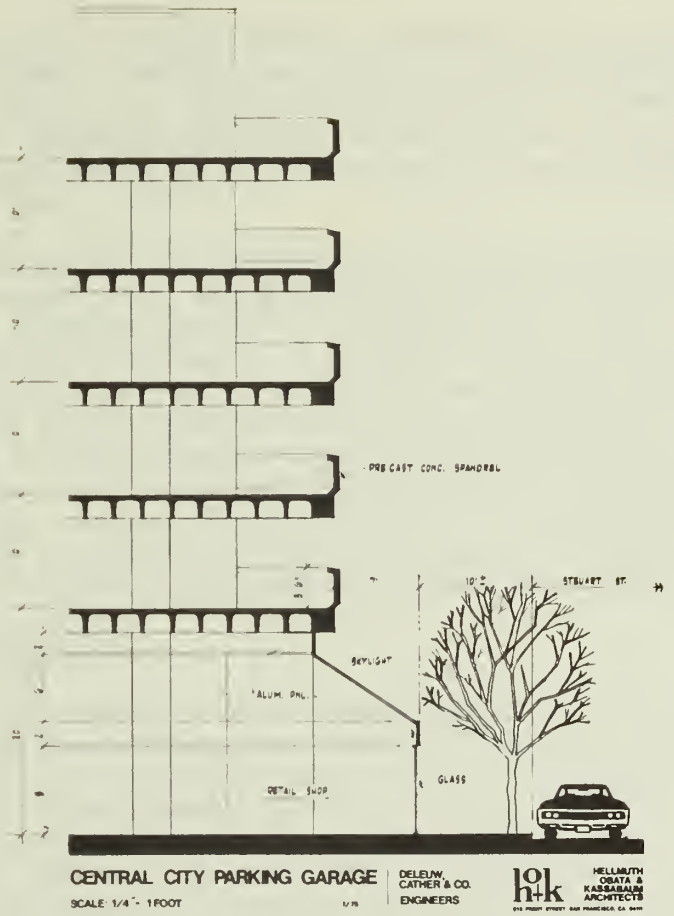
Vehicular circulation between the entry level and the first parking level would be by means of a two-directional semi-circular ramp. Thereafter, the parking levels themselves would be sloped near the ends of the sturcture to provide a ramp system. The design consultant considered the slope parking ramp approach to be a preferred design solution to achieve efficient space utilization on the limited site size.

A self-parking system would be used in the garage. An entering customer would take a ticket from the ticket spitter, the gate would open, and he would proceed up the sloping floor to the first available parking stall. On departure, he would hand the cashier his ticket and pay his fee, the gate would open, and he would depart. The entire operation, except collecting the ticket and making change, would be

---

* A spandrel is a facade extending from the structural bearing wall of the building. Refer to illustration in Figure 4, page 8.

** City policy, as stated by Janis Birkeland, Head of Project Review Section, Department of City Planning, encourages mixed use of parking facilities.



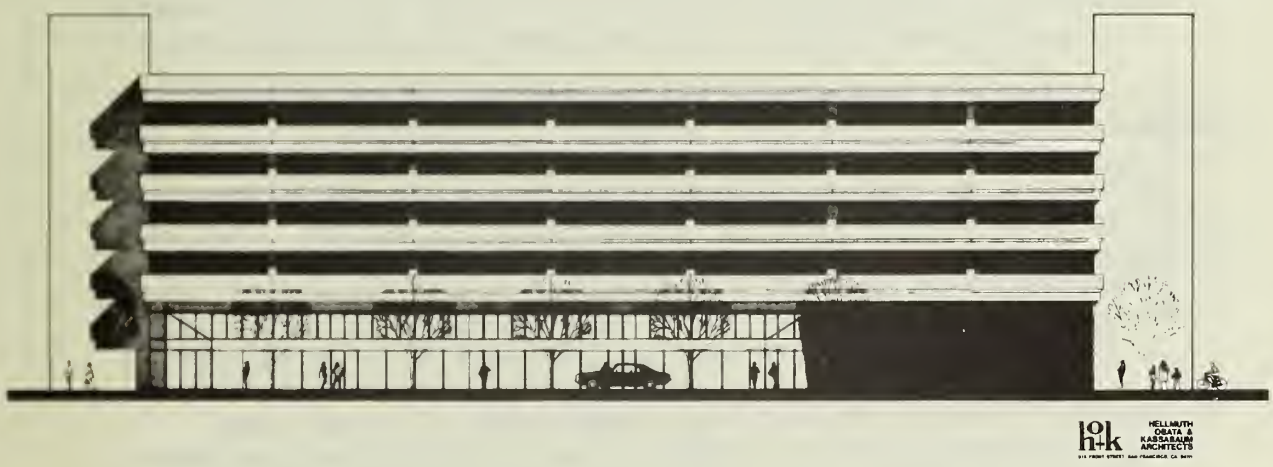


FIGURE 4

RENDERINGS OF PROPOSED STEUART STREET ELEVATION AND SECTION SHOWING COMMERCIAL SPACE SKYLIGHT AND PARKING LEVEL SPANDREL DETAIL ALONG STEUART STREET

automatic. An estimated three employees would be required to operate the garage for the projected 12-hour operating day (7 a.m. to 7 p.m.).

The garage would be monitored and operated with a minimum of equipment. Exit and entry control, as well as automatic vehicle inventory and recording, would take place at access points. No vehicle detection system would be needed on the garage floors. Since each patron would drive by every parking space on his way up, he would automatically be directed to a vacant space.

It is proposed that garage access and egress be limited to one entry lane, one exit lane, and a reversible entry/exit lane at Steuart Street and one entrance lane from The Embarcadero. This would require three ticket spitters and two exit booths, although the garage could be operated in off-peak periods by as few as one ticket spitter and one exit booth. The middle lane at Steuart Street would be reversible, being operated in the morning peak period as an entrance controlled by a ticket spitter, and in the evening peak period as an exit controlled by an exit booth. During off-peak periods, the reversible lane would be closed. Each exit would utilize an automatic folding gate which would release a customer after payment of parking charges.

DESIGN CHARACTERISTICS

The proposed structure would be bounded on the south by the downtown YMCA and on the north by the Audiffred Building. Aesthetic and design features of the proposed structure are illustrated on Figure 4. Since both of the adjacent structures are brick, and the garage is to be cast-in-place concrete, the stair core at each corner of the garage would be recessed and kept simple in texture to visually separate the open portion of the garage from the adjacent structures. The ground level space for small commercial establishments facing both Steuart Street and The Embarcadero might attract pedestrians.

Shops on the Steuart Street side would extend 5.5 feet out from the garage through use of a skylight. This adds to the gross leasable area and also provides the Steuart Street frontage with a design feature more characteristic of modern commercial shops than a parking structure. Between the skylight and the store front a two-foot high metal band would serve as a backdrop for uniform, controlled commercial signs. The shops facing Steuart Street also have the potential to create a loft or mezzanine space at the rear of each shop since the ceiling height is 16 feet (not the case along The Embarcadero).

Shops facing The Embarcadero would have store front glazing recessed two feet behind the garage above, and would contain the same two-foot high metal band for commercial signs. Sidewalks on The Embarcadero and Steuart Street would be planted with street trees.

The garage over the shops would be treated to be as simple in appearance as possible. The internal garage ramp system would permit horizontal spandrels facing The Embarcadero and Steuart Street.

ECONOMIC CHARACTERISTICS

Preliminary parking, architectural, structural, electrical, and mechanical plans were prepared for the facility and cost estimates developed by the design consultant with input from the architectural, mechanical, and electrical consultants. Their estimated cost of $6,400,000 includes the cost of land, design fees, construction of the structure, and commercial space finish costs and is based on 1975 conditions. Additional costs would be incurred for placement of bonds to finance the construction program. Additional costs may be incurred in relocating tenants of the existing buildings, as required for City of San Francisco projects. Annual operating revenues and costs are projected to be $467,000 ($359,000 parking/$108,000 commercial) and $100,000 respectively.

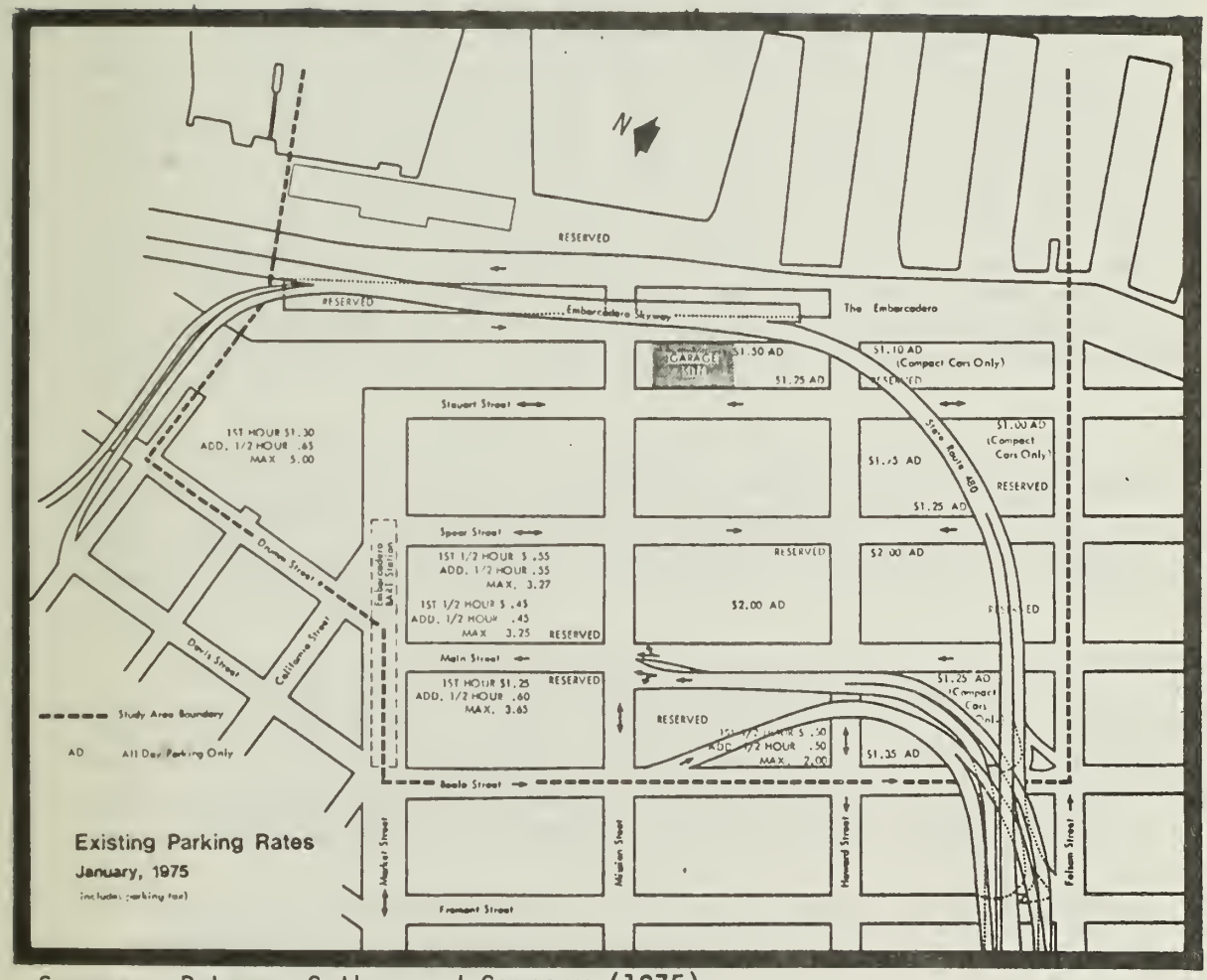
User costs for parking would be approximately as follows: $0.20-first half hour; $0.35-first hour; $0.40-each additional hour; and $3.00 maximum. This parking rate structure is designed to encourage short-term parking while retaining long-term rates competitive with other facilities in the area. Figure 5, reproduced from the sponsor's revenue and preliminary design report, illustrates comparable parking rate structures at other parking facilities in the vicinity of the project site (De Leuw, Cather and Company, 1975). Monthly rent for commercial space is projected to range from $0.50 to $0.75 per square foot with the higher rate applicable to the more desirable commercial frontage along Steuart Street.

PHASING AND DEVELOPMENT SCHEDULE

The project would be undertaken in its entirety in a single phase. The project sponsor anticipates that if entitlement to construct the project could be obtained by about April, 1977, that the project could be ready for operation by about July, 1978. Leasing of the Commercial space may take somewhat longer.

FIGURE 5

EXISTING PARKING RATES
JANUARY, 1975



Source: DeLeuw, Cather and Company (1975)

III ENVIRONMENTAL SETTING

GEOLOGY AND SOILS*

The proposed project site is essentially level and at an approximate elevation of -0.5 feet City of San Francisco Datum, which is approximately 8.6 feet above mean sea level.

The site is situated within the San Francisco Bay region which is regarded by seismologists as a seismically active area (Harding-Lawson Associates, 1976). Bedrock at the site consists of the Franciscan formation or assemblage, the oldest and most extensive rock unit underlying San Francisco which was originally deposited in a marine environment during the Jurassic-Cretaceous Age about 180 to 70 million years ago. It consits of well consolidated sedimentary, igneous and metamorphic rocks which are deformed from ancient folding and faulting. Borings in the area indicate the site is underlain by this formation, topped by a 60-100 foot layer of soft and compressible recent bay mud (primarily silty clay and clayey silt) and a 15-30 foot overlay of fill. The fill was placed in the years following 1849 and consisted of sand obtained from a large dune then located in the vicinity of Market and Second Streets. Subsidence of the filled area has occurred over time from the weight of the fill and structures which compressed the underlying bay mud. Most of the settlement expected has occurred and subsidence of the area is presently negligible (Dames and Moore, 1974; Goldman, 1969).

Several faults classified as active** pass within 20 miles of the proposed project site. They include the San Andreas (10 miles west), the Palo Colorado (16 miles west), the Hayward (10 miles east), and the Calaveras (20 miles east). These active faults are considered capable of producing earthquakes of Richter Magnitude*** 7 or greater (Green, et al., 1973).

Seismic activity along the active faults of the San Francisco Bay Area can be expected to affect the northeast waterfront area of San Francisco in which the proposed project site is situated to a greater extent than would be expected in other parts of the City because ground motions generated by earthquakes are usually amplified in areas of loose fill and unconsolidated sediments (Harding-Lawson Associates, 1976).

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* This section draws heavily from Harding-Lawson Associates (1976)-(Appendix D).

** An active fault is one that shows evidence of surface displacement during the past 10,000 years.

*** Richter Magnitude is a logarithmic measure of the total amount of energy released by an earthquake. The 1906 San Francisco earthquake reportedly had a Richter Magnitude of 8.3 (Tocher, 1959).

HYDROLOGY AND WATER QUALITY

The proposed project site and vicinity consist entirely of buildings and engineered surfaces. Runoff from roofed areas and pavement is by overland flow to gutters and inlets to storm drains. There are no known data describing the quality of runoff from the site*

VEGETATION AND WILDLIFE

The site is covered with structures and asphaltic concrete. Horticultural plantings are present (Eucalyptus, Geranium, English Ivy) and several weedy species have become established (clover, sour-grass, foxtail and bracken fern) (Rae, 1976). The major animal use of the site is by domestic pets owned by nearby residents. Birds also visit the site. Common urban micro-organisms may be assumed to inhabit the soil. There are no endangered animals in San Francisco (Department of Fish and Game, 1974). No endangered plants have been noted in the vicinity of the site (California Native Plant Society, 1974; map of Rare and Endangered Plants on file in City office of Environmental Review, August 1975; Department of Interior, 1976).

AIR QUALITY**

San Francisco in general has good circulation and ventilation as a result of favorable prevailing on-shore*** wind conditions. Meteorological data for downtown San Francisco**** indicates that the prevailing on-shore condition occurs approximately 64 percent of the time.

The proposed project site is part of the larger San Francisco Bay Air Basin within which pollutant levels are governed by interactions of emission sources (e.g., automobile, stationary sources) and meteorological conditions (e.g., winds, inversion). Air quality monitoring data for the air basin are compiled by the Bay Area Air Pollution Control District (BAAPCD) at a number of stations throughout the air basin. The nearest station is the San Francisco station at 939 Ellis Street. No quantified monitoring data are available for the proposed project site or the study area.

The Downtown San Francisco BAAPCD Station monitors oxidant (Ox), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and total suspended particulates (TSP). During 1975 the San Francisco

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* Sartor and Boyd (1972) describe the water quality characteristics of urban area runoff for those desiring further data on this subject.

** This section draws heavily on Ultrasystems (1976) (Appendix B).

*** From areas at sea to land areas.

**** Measured by National Weather Service, Federal Office Building, 50 Fulton Street.

station exceeded established state or federal ambient air quality standards for CO (3 times during the year), TSP (2.6 percent of observed days) and SO_2 (1.7 percent of observed days). Ox and NO_2 concentrations did not exceed standards during the 1975 monitoring year (BAAPCD, 1976). In general, BAAPCD data indicate that the Downtown San Francisco Station experiences fewer violations of ambient air quality standards than do most other stations in the district's monitoring network. Table A presents 1975 monitoring data for the BAAPCD's Downtown San Francisco Station indicating the number of times ambient standards were exceeded each month.

Because of the lack of site specific data, existing air quality in the vicinity of the project was modelled mathematically using a Gaussian Plume Technique* with model inputs selected to represent a worst case condition (Ultrasystems, 1976). The results for CO and NO_2 are presented in Figure 6.

CIRCULATION, TRAFFIC, AND PARKING**

Circulation and Capacities. The proposed project site is bounded on the east and west by The Embarcadero and Steuart Streets respectively, both of which are designated in the Transportation Element of the

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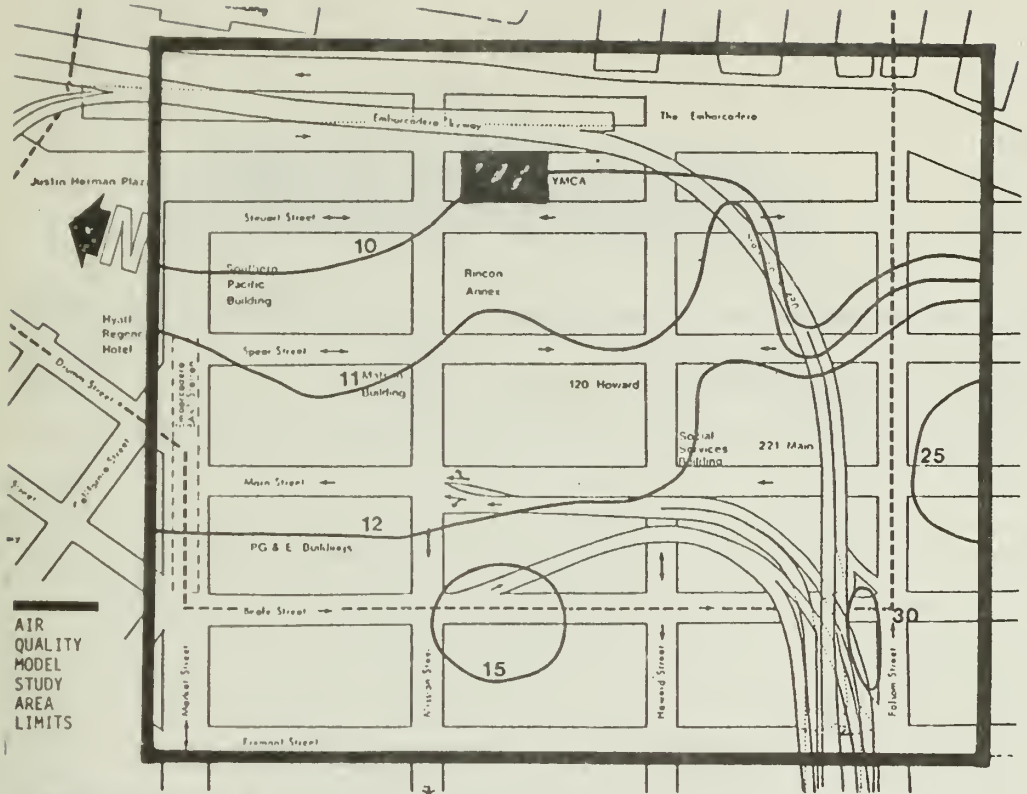
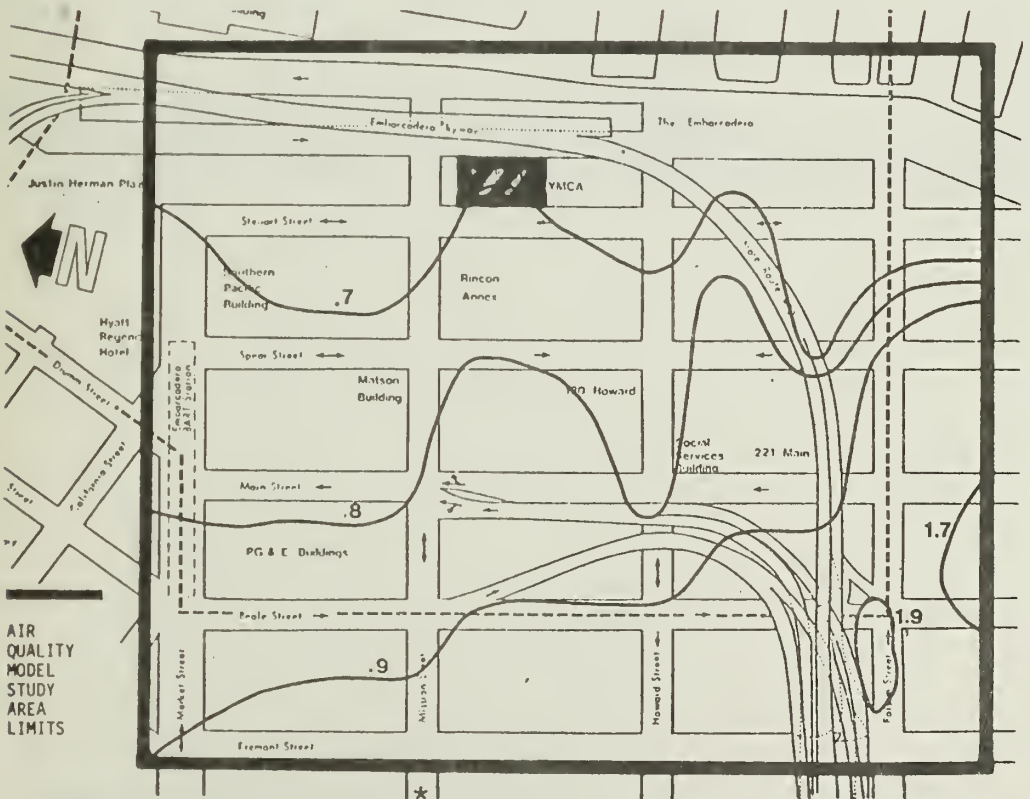
* "Gaussian Plume Modelling" is a technique used in air resources engineering to describe the dispersion of pollutants downwind from point sources (e.g., industrial stacks) and line sources (e.g., roadways). The model is based on the solution to the (convective-diffusion) equations governing dispersion. So-called Gaussian coefficients are incorporated into the basic solution to account statistically for the influence of atmospheric turbulence in determining the mixing behavior. The Gaussian plume modelling technique is described in air resource engineering textbooks, e.g., Stern, et al., Fundamentals of Air Pollution, Academic Press, 1974, and documented in Workbook of Atmospheric Dispersion Estimates by D. Bruce Turner of the U.S. Department of Health, Education and Welfare (PHS 999-AP028, 1970). Modelling was selected opposed to on-site measurement because it offered a means whereby before-after project conditions could be compared against a standardized set of conditions. In addition, variations that could result from abnormal traffic or meteorologic conditions at the time of monitoring were not introduced. Assumptions used in the modelling included: 1) peak hour traffic volumes as shown in Table 3, page 85 of the Air Quality Appendix, 2) wind off the Bay at a velocity of 2.5 mph, 3) angle of incidence with the freeway of 20^0, 4) freeway decks elevated 20' and 35' above ground, 5) stable atmospheric conditions and 6) average vehicular speed of 10 mph. Model validation studies of Gaussian Plume Models show differences between modelled and actual conditions as great as a factor of 2.

** This section draws heavily from technical information contained in Goodrich (1976) (Appendix B), and De Leuw, Cather and Company (1975).



CARBON MONOXIDE ISOPLETHS* FOR EXISTING WORST-CASE PEAK HOUR CONDITIONS (PARTS PER MILLION)



NITROGEN OXIDES ISOPLETHS* FOR EXISTING WORST-CASE PEAK HOUR CONDITIONS (PARTS PER MILLION)

*An Isopleth is a line connecting points that have equal or corresponding values.

FIGURE 6

LOCAL CO AND NO_2 AMBIENT AIR QUALITY CONDITIONS

TABLE A

NUMBER OF DAYS AMBIENT AIR QUALITY STANDARDS WERE EXCEEDED AT THE DOWNTOWN SAN FRANCISCO MONITORING STATION IN 1975

Month	Pollutant*				
	Ox	CO	NO_2	SO_2	TSP
January		1		1	1
February					
March					
April					
May					
June					
July					
August					
September					
October		1			1
November					
December		1		1	1
Year	0	3	0	2	3

Source: Bay Area Air Pollution Control District

* Ambient Standards are: Ox - 0.08 ppm (Federal); CO - 9 ppm (Federal); NO_2 - 0.25 ppm (State); SO_2 - 0.10 ppm (State); TSP - 100 mg/m^3 (State).

Comprehensive Plan of San Francisco (1972) as Major Thoroughfares.* The nearest intersecting thoroughfare is Howard Street. There are no secondary thoroughfares** or recreational streets*** in the vicinity of the site. Steuart Street, in the block fronting the site, is one way with two unstriped traffic lanes northbound; The Embarcadero is a divided thoroughfare with access from two southbound traffic lanes in the block fronting the site (northbound access is possible but difficult). The double-decked Embarcadero Freeway passes just to the east of the site, elevated above The Embarcadero (Figure 2). Street intersections at the corners of the block are controlled by stop signs except for the intersection of Mission Street and The Embarcadero which is controlled by automatic signals.

Current traffic volumes in the vicinity of the project site are close to those identified on the "24-hour traffic flow" map prepared by the Department of Public Works (1973). During the afternoon peak hour, intersections in the vicinity of the site are operating at 30 to 40 percent of capacity of service level D**** Analysis of projections to the year 1985 indicate these intersections would then be operating at 40 to 50 percent of capacity (Department of Public Works, 1970).

Although the U.S. Post Office Rincon Annex generates a sizeable amount of traffic, over 80 percent of this traffic is reflected in the traffic counts on Mission and Howard Streets. Use of Steuart Street is predominately for two to three times a day access to the loading zone of the Rincon Annex where trucks are parked perpendicular to the building.

The effects of special events at the proposed Yerba Buena Sports Center, about 3/4 mile from the project site, would not further exceed intersection design capacity near the site since peak hour levels from such events on nearby streets would be less than afternoon peak levels and would occur at off-peak hours (Goodrich, 1976).

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* Major thoroughfares are defined as cross-town thoroughfares of city-wide significance whose primary function is to link districts within the city and to distribute traffic from and to the freeways (Department of City Planning, 1972).

** Secondary thoroughfares are primarily intradistrict routes serving as collectors for the major thoroughfares (Department of City Planning, 1972).

*** Recreational streets are a special category of streets whose major function is to provide for slow pleasure drives, cyclist and pedestrian uses; more highly valued for recreational use than for traffic movement (Department of City Planning, 1972).

**** Service level D approaches unstable flow. Tolerable average operating speeds are maintained but are subject to considerable and sudden variation. Freedom to maneuver and driving comfort are low because lane density has increased and the probability of accidents has increased (Institute of Traffic Engineers, 1976).

A major roadway project near the site, removal of The Embarcadero Freeway elevated structure and subsitution of a combined at grade/ depressed limited access 4- to 6-lane arterial route along The Embarcadero, is proposed as shown on Figure 7 . While the proposal appears to have the support of agencies with jurisdiction over transportation projects, no funds are yet available and no schedule has been determined. If implemented, it would result in changes to the existing circulation system in the vicinity of the project site. Other roadway changes are proposed in the vicinity of the site in the future as transit system elements are completed, but they would not result in material effects on existing capacities.

Parking. The project site is within a designated "parking belt," and area designated in the Transportation Element of the Comprehensive Plan of San Francisco (1972) as appropriate for short-term parking facilities to replace spaces removed from the downtown core area. Studies of present parking characteristics in the vicinity of the proposed project site were conducted by De Leuw, Cather and Company (1975) in November of 1974 and by Goodrich (1976) and included inventories of curb and off-street spaces and space utilization. On the block bounded by The Embarcadero, Mission, Howard and Steuart Streets there are 53 metered (20 2-hour; 33 1-hour) curb spaces and 97 off-street spaces; 37 of the off-street spaces are located on the proposed project site.

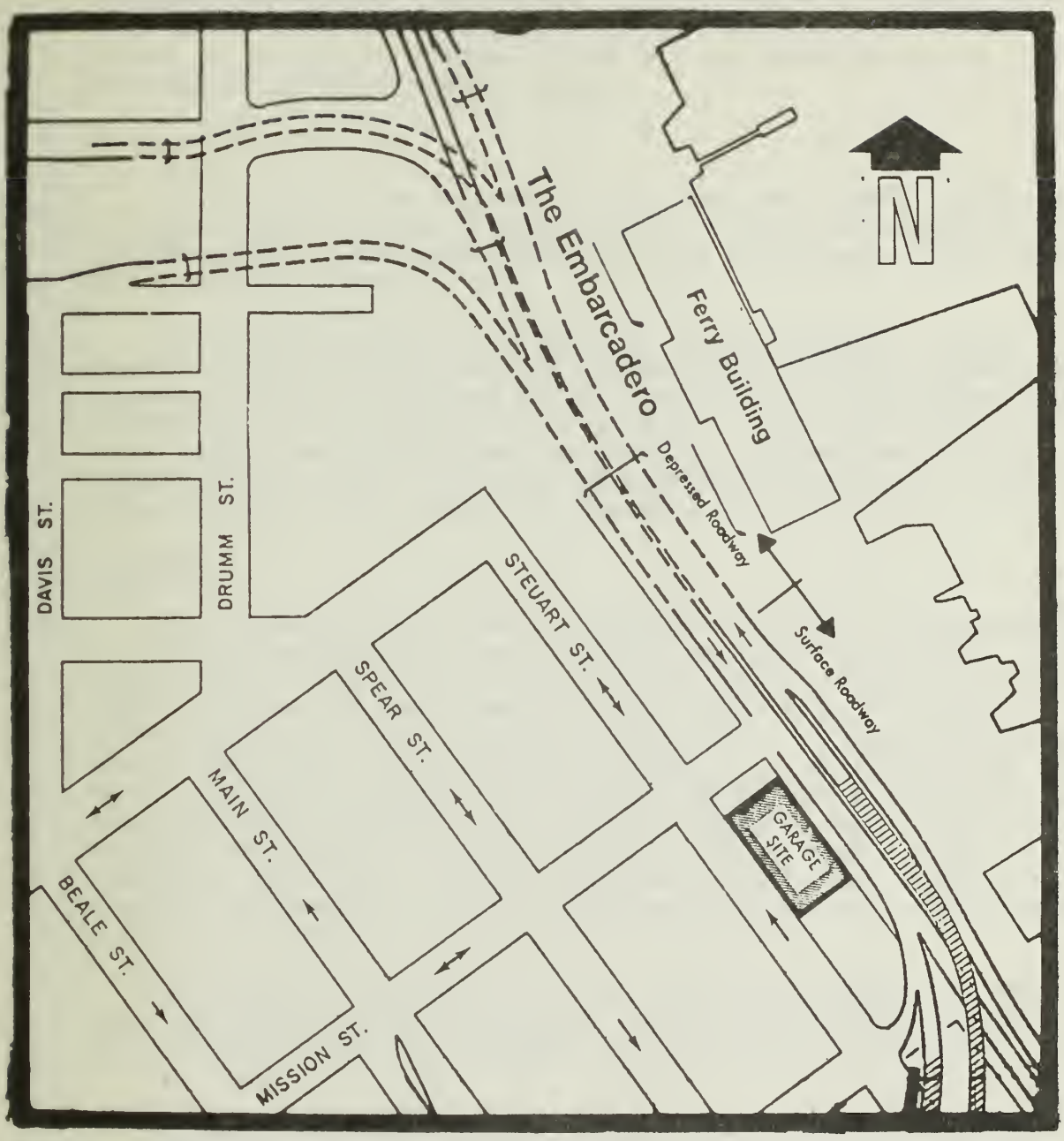
Within the study area there are a total of 4,272 parking spaces, 85 percent of which are off-street. Parking rates vary from free to $5.00 per day (De Leuw, Cather and Company 1975).

Transit Service. Within the proposed project vicinity, eleven Municipal Railway (Muni) surface transit lines are concentrated along Market and Mission Streets. Three other Muni lines loop through the fringe of the area on Drumm, Main and Beale Streets. The property on the north side of Mission Street west of The Embarcadero and about 1/2 block from the proposed project site is used as a route terminus for ten of these lines. An additional line operates along The Embarcadero between Fisherman's Wharf and the Southern Pacific passenger terminal.

Golden Gate Transit provides bus service from Marin County to The Embarcadero-Mission area, with the closest regular stop on Fremont Street opposite the Transbay Transit Terminal; a commute period bus stops at the corner of Main and Folsom Streets. AC Transit provides bus service from the East Bay to the Transbay Transit Terminal.

Access to the BART System is provided by The Embarcadero Station on Market Street at Main Street. Upon completion of the Muni Metro subway beneath Market Street, street car lines presently operating at surface level along Market Street will operate underground with an eastern terminus at The Embarcadero Station, which opened May 26, 1976 (BART, 1976).

Ferry service is provided from Sausalito, Tiburon and Larkspur to a ferry landing near the foot of Market Street across The Embarcadero from the site. This service is planned to be upgraded in the future, including construction of a new ferry landing at the BART platform opposite the Ferry Terminal Building.



Source: DeLeuw, Cather and Company (1975)

FIGURE 7

PROPOSED EMBARCADERO ROADWAY RECONSTRUCTION

During 1977, the City plans to implement "transit preferential" treatment for Mission Street between Beale and Eleventh Streets, with one transit lane and one auto lane in each direction. East of Beale Street, no changes are planned for the Mission Street roadway to accommodate additional transit usage.

NOISE

In the area of the proposed project there are a number of sources of noise. These include vehicular traffic on local thoroughfares and the Embarcadero Freeway and, temporary noise associated with construction equipment on nearby sites.

The Transportation Noise section of the Environmental Protection Element of the Comprehensive Plan for San Francisco (1974) suggests that L_{DN} noise levels* in the part of San Francisco where the proposed site is located generally range from 65 to 85 dBA** (Department of City Planning, 1974b). Measurements made on March 22, 1976 and presented in Figure 8 confirm these levels for the proposed project site. Figure 15, page 39, shows typical urban noise levels as a comparison.

LAND USE

The proposed project site is presently occupied by a paved parking lot and four buildings ranging in height from two to six stories. Principal structures on the site date from the maritime support period with uses reflecting the former period (hotels, bars) as well as current office support (parking, restaurant) functions. Principal uses of the area during March, 1976 are shown on Figure 9. At that time about 1/4 of the "store front" area of the site was vacant with about 1/4 being upgraded through remodelling or other improvements, some of which was mandated by condemnation action, because of public health safety problems. For example, 128-132 Embarcadero-Harbor Hotel faced condemnation proceedings by the City Attorney's Office, but recently took out building permits to make required repairs.***

Adjoining the project site to the south is the eight-story YMCA Hotel and Gymnasium; to the north is the Audiffred Building which houses Riordan's, Betty's Hoffbrau, and Dori's 21. The Audiffred

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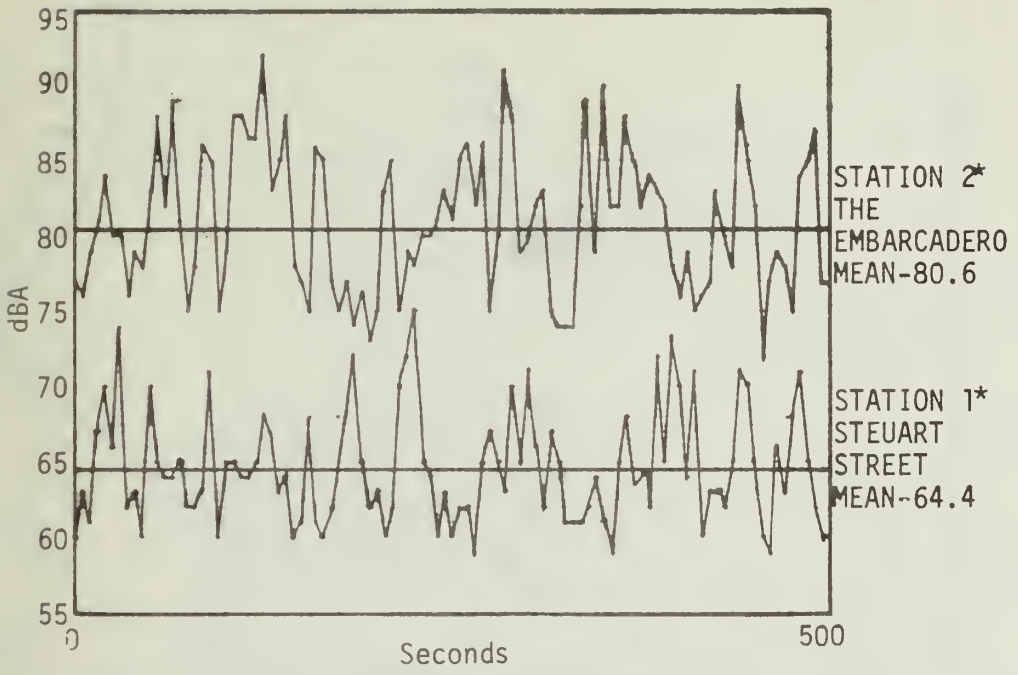
* L_{DN} noise levels are 24-hour equivalent noise levels in decibels weighted for day and night equivalency. This measurement of varying sounds over time translates fluctuating sound pressure level to a constant level having the same sound energy. dB (decibel) is a unit of sound energy on a logarithmic scale weighted to correspond approximately to human perception of sound, making it possible to compare common urban noise levels.

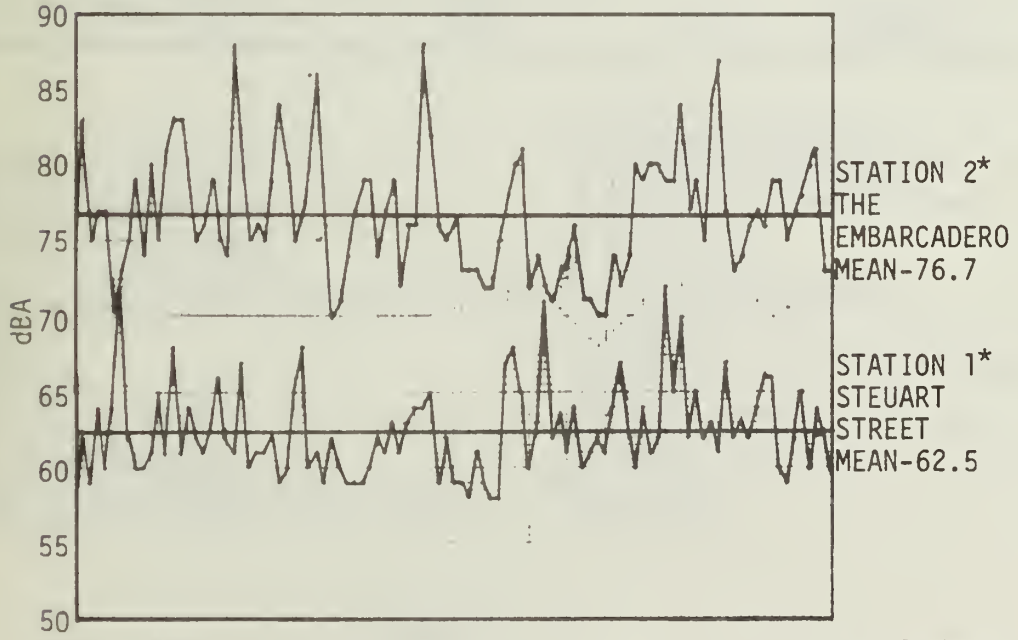
** The decibel reading obtained with a noise measurement instrument with a frequency sensitivity similar to that of the human ear at commonly encountered urban noise levels.

*** Telephone conversation with Mr. J. Powers, Building Inspector, San Francisco Department of Property Conservation on April 21, 1976 regarding building inspection results for properties within proposed project site.

PEAK HOUR AMBIENT NOISE LEVELS (dbA)
MARCH 22, 1976-1640-100 MEASUREMENTS @ 5 SEC INTERVALS



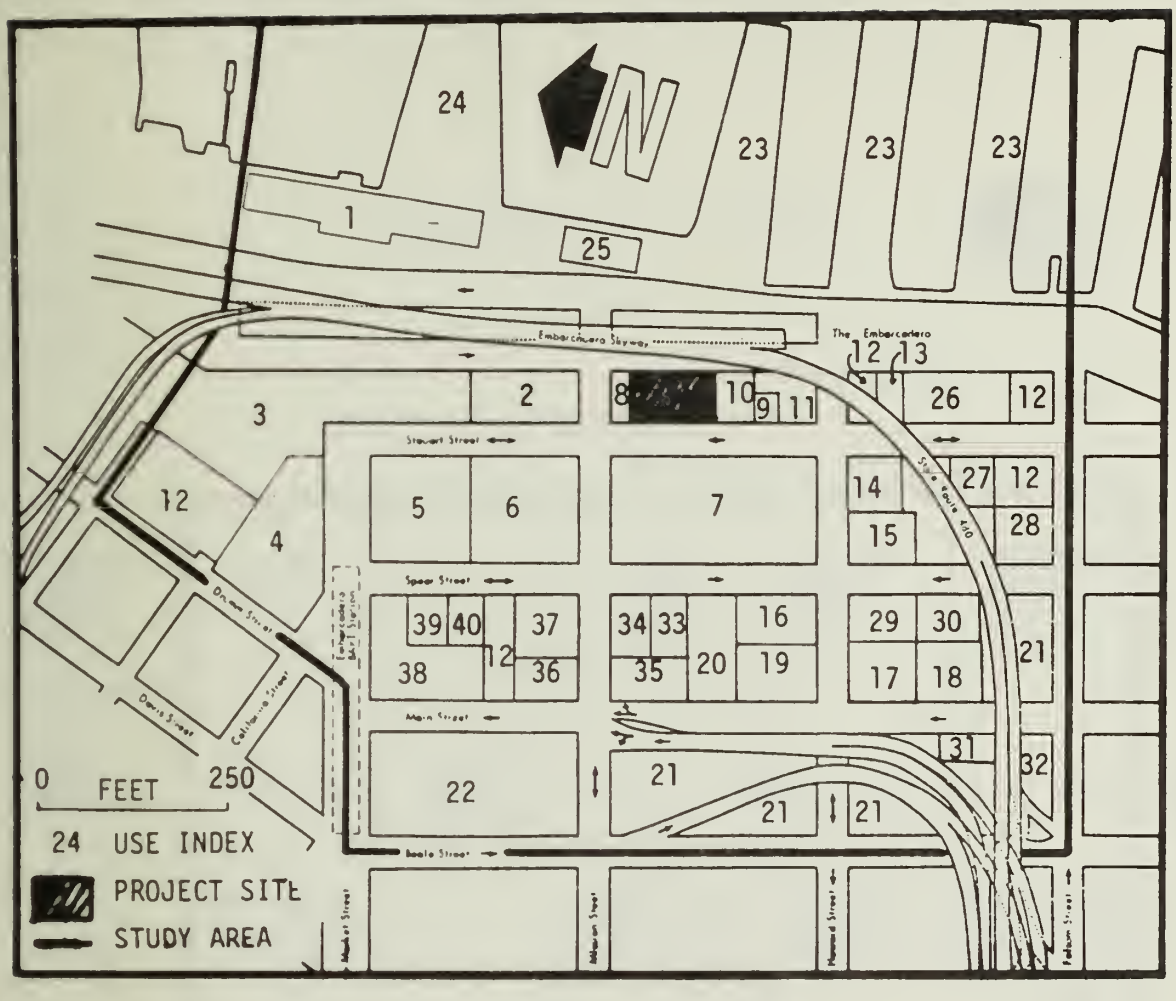
OFF-PEAK HOUR AMBIENT NOISE LEVELS (dbA)
MARCH 22, 1976-1300-100 MEASUREMENTS @ 5 SEC INTERVALS



Note: Measurements made with B&K Type 2205 Sound Level Meter.
*Stations located 180' south of the south curb of Mission Street at curb on noted street.

FIGURE 8

RESULTS OF NOISE MONITORING SURVEY

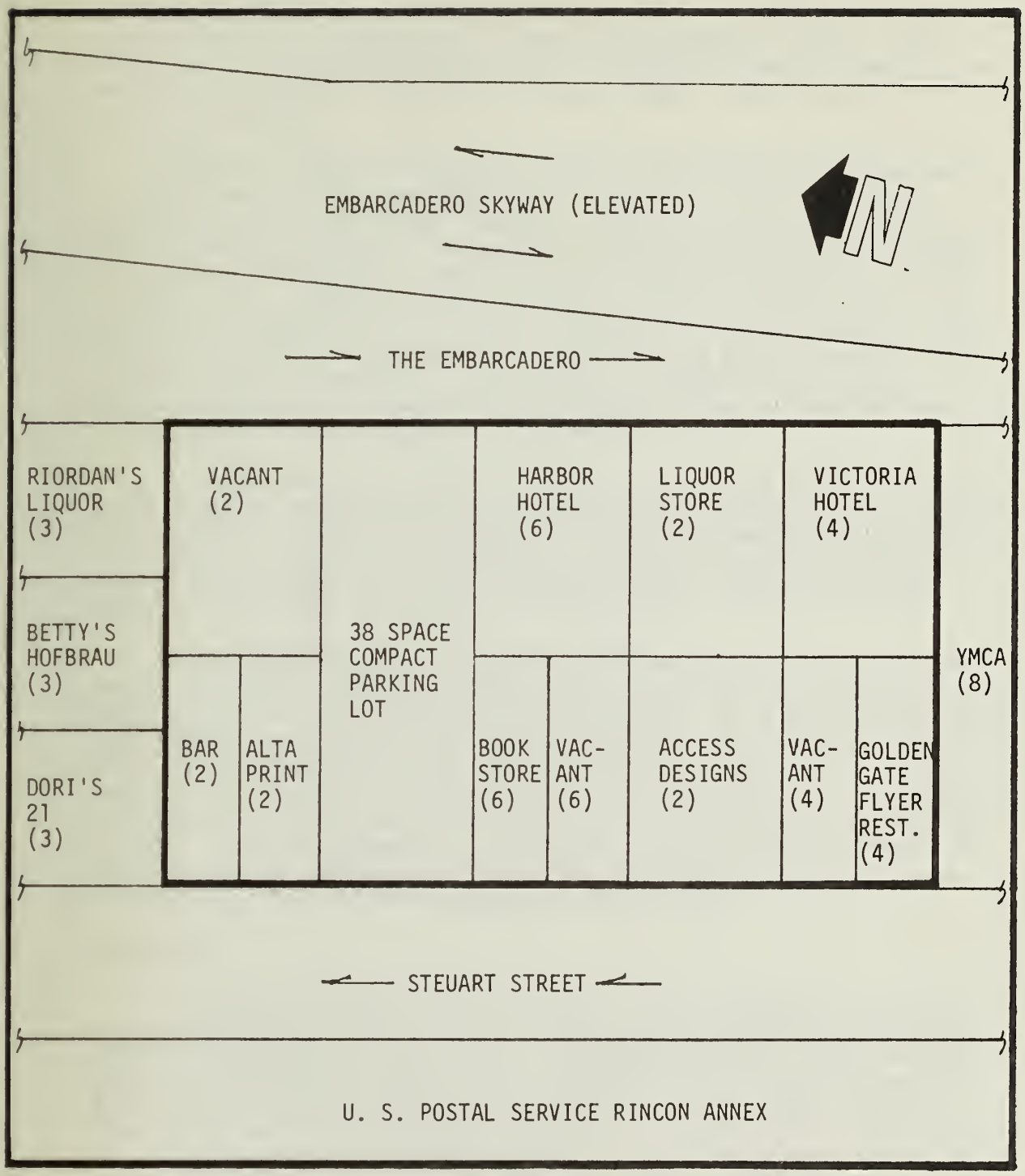


1. FERRY BUILDING (PUBLIC OFFICES)
2. MUNI BUS PARKING AND TRANSFER STATION
3. JUSTIN HERMAN PLAZA (PARK)
4. HYATT REGENCY HOTEL
5. SOUTHERN PACIFIC OFFICE BUILDING
6. ONE MARKET PLAZA OFFICE BUILDING
7. U.S. POSTAL SERVICE RINCON ANNEX
8. AUDIFFRED BUILDING THREE BARS (HISTORIC LANDMARK BUILDING)
9. COMMERCIAL LABORATORIES (3)
10. DOWNTOWN YMCA
11. PARKING LOT
12. PARKING LOT
13. VACANT HOTEL
14. HOWARD STEUART PARKING GARAGE
15. PARKING LOT
16. 120 HOWARD OFFICE BUILDING
17. SOCIAL SERVICES OFFICE BUILDING
18. 221 MAIN BUILDING (PROPOSED)
19. PARKING LOT (PROPOSED HOWARD/MAIN OFFICE BUILDING)
20. PARKING LOT
21. PARKING LOT
22. P.G.&.E. OFFICE BUILDINGS
23. PIER WAREHOUSE AREA AND STORAGE
24. PIER WAREHOUSE AREA AND STORAGE (PROPOSED RESTAURANT)
25. AGRICULTURE BUILDING (OFFICES)
26. MARINE TERMINALS CORPORATION (STEVEDORE)
27. SAILMAKER
28. VACANT WAREHOUSE
29. FOLGER BUILDING
30. SIXTEEN STORY OFFICE BUILDING
31. PHOTO SUPPLY AND OFFICE BUILDING
32. PRINTER AND HOBBY SHOP
33. RESTAURANT
34. COMMERCIAL RETAIL (SPORTS SHOPS, HI-FI SHOP, ETC.)
35. PRINTING SUPPLIER AND ELECTRONICS LABORATORY
36. GAS STATION
37. MATSON OFFICE BUILDING
38. COMMERCIAL RETAIL (BANK, BARBER, RESTAURANT, ETC.)
39. UNEMPLOYMENT OFFICE
40. SHIPFITTER

LAND USE CATEGORY

FIGURE 9

PROJECT STUDY AREA LAND USES
OCTOBER, 1976



Source: Site Survey of Land Uses

Note: ( ) = Building Height in Stories

FIGURE 10

DIAGRAM OF LAND USE AT PROJECT SITE OCTOBER 1976

Building was designated Historic Landmark No. 7 in 1968 by the San Francisco Board of Supervisors (City of San Francisco, 1974). The Rincon Annex Post Office adjoins the site across Steuart Street to the west and the elevated double-decked Embarcadero Freeway adjoins the site to the east.

Land uses within the proposed project study area are varied and include hotels, office buildings, parking areas, light industrial and retail commercial establishments. Most of the older structures in the area are a residue of the maritime industry which once flourished in the area with uses in transition from this former purpose to office support uses. Land uses within the study area are shown on Figure 9. Most of the commercial uses are now oriented to support employee populations of office uses within the study area and adjoining office areas north of Market Street, but a few remain oriented toward support of port/shipping uses. Examples of the former include 33 and 38; examples of the latter include 26 and 27 (Figure 9).

The proposed project site is in the C-3-O Zoning District, a district in which commercial use is permitted as a primary use and parking permitted as a Conditional (subject to Planning Commission approval) Use. The City Planning Code permits a maximum floor area 14 times the area of the lot but has no lot coverage or open space requirements (City of San Francisco, 1974).

In the Transportation Element of The Comprehensive Plan for San Francisco, (1972), the proposed project site is in the south-of-Market parking belt, an area designated as appropriate for short-term parking facilities so as to intercept vehicles entering downtown San Francisco from major thoroughfares prior to reaching the downtown core. This parking belt is intended primarily for short-term parking for shoppers, visiting businessmen, and others who do not find transit service convenient. The plan suggests that commuters generally have convenient transit service available and should be discouraged from using these parking facilities by high charges on all-day use.

POPULATION

The proposed project site is located within Census Tract 176, an elongated tract bounded by Market Street, Howard Street, 11th Street, and San Francisco Bay (Figure 11). According to 1970 Census data (Department of Commerce, 1972), the permanent population of the tract was 4,832. Most persons living in the area are in the "lower income"* level and live in the transient hotels of the area, such as the Victoria Hotel and the Harbor Hotel (combined 242 rooms) which are located on the proposed project site. The manager of the Victoria Hotel indicates that hotel residents are mostly in two categories--those who are retired and those who work in town or have business interests nearby. An average occupancy of 70-80 percent is experienced (Baker, 1976).

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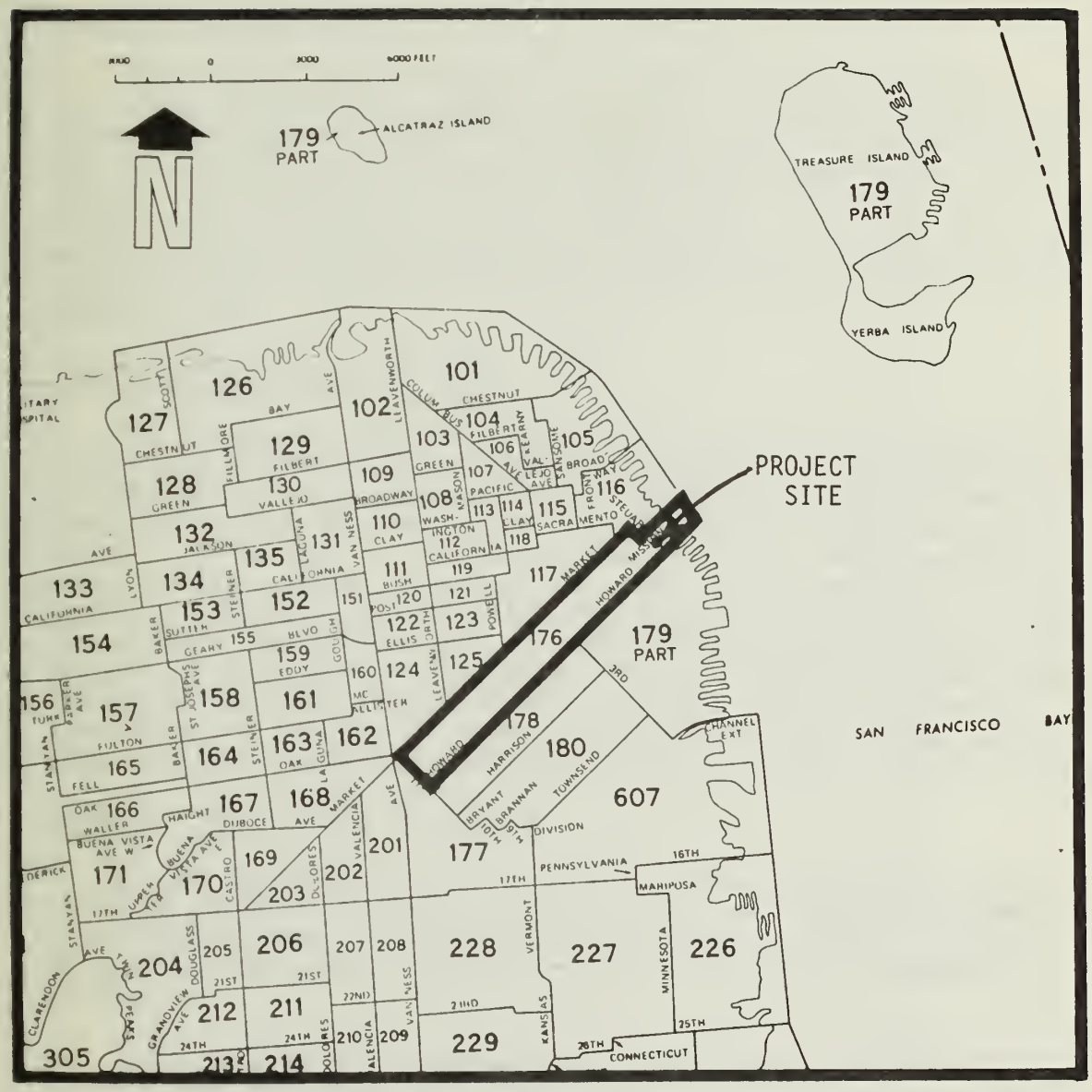
* Based on Federal and local data for the San Francisco area, "lower income" level is defined as households having a gross income of 80 percent or less of the median income of a local metropolitan area.



Source: Department of Commerce, 1972.

FIGURE 11

SAN FRANCISCO CENSUS TRACTS

The daytime population of the area consists mostly of office workers. Of these, typically, 60 percent live in San Francisco, 13 percent in the East Bay, 7 percent in Marin County and 15 percent in San Mateo County (Department of Commerce, 1972; San Francisco Bay Area Transportation Study Commission, 1969).

HISTORY AND ARCHAEOLOGY

The proposed project site is in a filled area that was once a part of San Francisco Bay approximately 1,700 feet east of the original shoreline. Placement of sand fill, obtained from a large sand dune near what is now the intersection of Market and Second Streets, began after about 1849 and continued until about 1900. According to Mr. Harlan Soeten (1976) of the San Francisco Maritime Museum, the site itself is not believed to have archaeological or historic significance, although buried remnants of sunken wooden ships may be present in the fill beneath the site.

VISUAL AND AESTHETIC CONDITIONS

The proposed project site has the appearance commonly associated with use of properties on the edge of the Downtown Office district. It is comprised of an assemblage of old commercial buildings and one surfaced parking lot (Figures 12 and 13). A dominant element adjacent to the site on the east is the elevated, double-decked Embarcadero Freeway, a massive concrete structure that dominates the waterfront in this section of the City. West of the site, across Steuart Street, is the Rincon Annex Post Office, a large concrete building occupying most of the block. Immediately south of the site is the eight-story YMCA Building and to the north is the historic Audiffred Building (Figure 13). Views from the site are of surrounding buildings, the Freeway, and beyond, the Ferry Building, waterfront warehouses and San Francisco Bay.

COMMUNITY SERVICES AND UTILITIES

Police Protection. The San Francisco Police Department reports that 3891 incidents for which a police report was generated occurred in the general area of the project site (Census Tract 176) during a 12-month period representing a rate of 42 incidents per thousand population.*

Fire Protection. Fire protection in the area is provided by the San Francisco Fire Department. The nearest fire station is Station 13 located at 530 Sansome Street. An alarm box is located at the corner of Steuart and Mission Streets. According to the Fire Department,**

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* As reported in an evaluation of police services for the proposed project prepared by the San Francisco Police Department on March 29, 1976, on file and available for public review at Department of City Planning, Office of Environmental Review.

** Letter of March 24, 1976 from Robert E. Rose, Division of Planning and Research, San Francisco Fire Department, on file and available for public review at Department of City Planning, Office of Environmental Review.

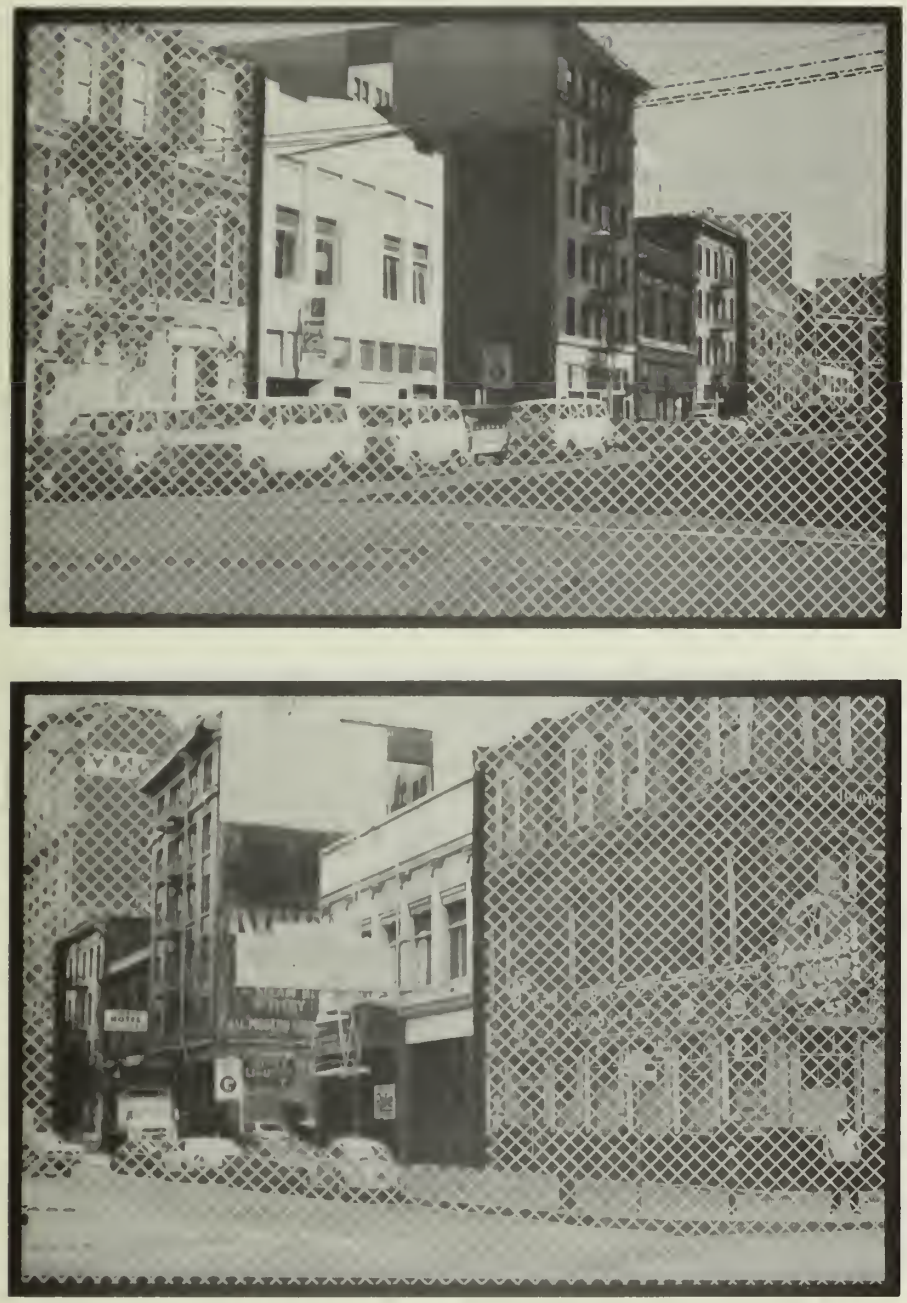

FIGURE 12

VIEWS OF THE SITE ALONG STEUART STREET (TOP) AND THE EMBARCADERO (BOTTOM)

FIGURE 13

VIEW OF HISTORIC AUDDIFRED BUILDING ADJOINING PROPOSED PROJECT SITE (TOP) AND RECENTLY REMODELED STOREFRONT RESTAURANT ON STEUART STREET SIDE OF PROJECT SITE (BOTTOM)

water supply in the area is adequate with nine hydrants of the City's domestic water system and an additional six high pressure hydrants of the Fire Department's Auxiliary Water Supply System located on the block bounded by The Embarcadero, Mission, Howard and Steuart Streets.

Energy/Gas and Electricity. Gas and electricity in the vicinity of the project site are provided by the Pacific Gas and Electric Company from lines in adjacent street rights-of-way.*

Water. Water service in the area is provided by the City Distribution Division of the San Francisco Water Department from a 12-inch main in Steuart Street and a 6-inch main in The Embarcadero.**

Sewer. Sewer service in the area is provided by the San Francisco Department of Public Works from existing lines in Steuart Street.***

ECONOMIC CHARACTERISTICS

At present the County Assessor has established the market value of the property and improvements at $592,420 with a resultant assessed value of $148,105 (592,420 x .25). The tax rate per $100 assessed valuation for 1975-1976 is $11.50 for a resultant annual property tax of $17,032.

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* As reported by R.N. Podesta, Industrial Power Engineer for Pacific Gas and Electric Company in correspondence dated March 6, 1975 and March 19, 1975.

** As reported by J.E. Kenck, Manager, City Distribution Division of the San Francisco Water Department in correspondence dated March 29, 1976.

*** As reported by S.M. Tatarian, Director of Public Works, City of San Francisco in correspondence dated April 8, 1976 and in proposed project documents.

IV ENVIRONMENTAL IMPACT

GEOLOGY AND SOILS*

Geologic effects can be divided into two categories--impacts and hazards. Impacts are those changes that a project may induce in the geologic condition of a site. Hazards are those problems which geotechnical conditions, both site specific and of regional character, may pose for a project.

The foundation of the proposed structure would rest on piles connected by grade beams. The top of the grade beams would be 4 to 5 feet below the finished first floor which is at the same elevation as the existing sidewalk. Therefore, below grade construction would be above the prevailing water table with the exception of special rooms, elevator pits and walls adjoining the north (Audiffred) and south (YMCA) property lines. These excavations would have to be lowered to at least the depth of the adjacent construction as required by Section 832 of Deerings Civil Code which relates to notice to adjoining property owners and spells out responsibilities. Some local dewatering may be required in these situations. There is always the possibility of damage occurring to adjacent structures due to conditions unknown or unforeseeable. This matter has been reviewed by two structural engineers for the project sponsor (Richard B. Gould-S1439; Burton A. Lewis-S1209) who have concluded that the likelihood of any damage should be minimal (De Leuw, Cather and Company, 1976c).

There are a number of geologic hazards that would be expected to affect the site during the lifetime of the proposed project; they are described in the following paragraphs.

General Seismic Hazards. Since the site is within a highly seismic region, future earthquakes are likely to occur during the lifetime of the proposed structure. Based on the historic record and recent estimates (Borcherdt, 1975; Department of City Planning, 1975a), the project could experience an earthquake as great as magnitude 8.3 on the Richter Scale which is the same as the 1906 earthquake. The duration of strong ground shaking could be up to 40 seconds (John A. Blume and Associates, 1974).

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* The discussion of geologic impacts and hazards draws heavily from a report by Harding-Lawson Associates, (1976) which is on file with the Department of City Planning.

Fault Movement. Surface rupture from future faulting at the project site is unlikely since there are no known active faults present. While there is always some risk of surface faulting at any location within a seismically active region, the probability of its occurrence is much greater along the trace of faults that have been most recently active, such as the San Andreas and Hayward fault zones (Harding-Lawson Associates, 1976).

Liquefaction. Liquefaction occurs in loose sandy or silty soils with saturated or high ground-water conditions as a result of vibrations, usually seismically induced, which densify the soil by movement of water from the voids. Liquefaction can have the effect of lowering the existing surface by consolidation of the liquifiable zone or by flow-slide failure. Depending on the extent and condition of the sand fill underlying the project site, liquefaction could occur during major earthquakes (Harding, Miller, Lawson and Associates, 1970).

Differential Compaction. Loose soils, including fill, can compact or densify during severe ground shaking and cause irregular surface settlement or differential compaction. Settlement of this type was common in the 1906 earthquake, particularly in the filled area near the waterfront. Depending on the extent and conditions of the fill underlying the project site, settlement of the ground surface surrounding the building could occur during major earthquakes (John A. Blume and Associates, 1974).

Ground Rupture. Ground rupture can be related to various effects from seismic shaking. Lurch cracks are common occurrences in weak soils adjacent to slopes during ground shaking. Surface cracks can develop from liquefaction and differential compaction. Ground ruptures were very common in the 1906 earthquake, particularly in areas of weak fill overlying bay mud. Similar occurrences are possible for the site during a major earthquake (Harding-Lawson Associates, 1976).

Ground Shaking. Ground shaking from future earthquakes in the Bay Area will undoubtedly be felt on the site and probably represents the highest risk with respect to seismic effects. The intensity of ground shaking will depend on the distance from the earthquake epicenter, the magnitude of shock, and the physical properties of the underlying soil conditions. Ground motions are usually amplified in the areas of loose fill and unconsolidated sediments. Areas underlain by bay mud would experience relatively higher intensities. In the 1906 earthquake, the filled area adjacent to the waterfront experienced "violent" shaking and was characterized by "fairly general collapse of brick and frame buildings when not usually strong;..." (John A. Blume and Associates, 1974; Goldman, 1969; Lawson, 1908). During the maximum expectable earthquake for the area (Richter Magnitude 8.3 on the nearby San Andreas fault), it is likely that the project site would experience ground motion as severe as that which occurred during the 1906 earthquake. "However, resultant damage is likely to be significantly less due to the vast improvements in design and construction of buildings and facilities since 1906" (Harding-Lawson Associates, 1976).

Tsunamis. Earthquakes that occur below or close to large bodies of water can generate seismic sea waves (tsunamis) which travel great distances at high velocities. The shoreline around San Francisco Bay is vulnerable to tsunamis; however, their occurrence has been light to moderate. Great earthquakes in the Pacific Ocean and in Alaska have been known to generate tsunamis which travel at hundreds of miles per hour and can cause wave run-ups which can flood low-lying areas. Generally, the wave height in bays and in closed basins is significantly reduced due to attenuation. The estimated tsunami run-up (vertical wave height) along the shoreline closest to the site will be 5.5 feet on the average of once per 100 years and 9.7 feet once per 500 years (U.S. Army Corps of Engineers, 1975). These values are references to the Mean Sea Level (MSL), datum. Since the elevation of the site is approximately 8.6 feet (MSL), it is unlikely that significant damage would occur to the structure or facilities during its lifetime from tsunamis. The simultaneous occurrence of a high sea level from storms and tsunamis is highly improbable (U.S. Army Corps of Engineers, 1975).

Seiches. Seiches are oscillating waves generated in closed basins such as harbors or lakes. They can occur from severe ground shaking due to earthquakes or from disturbances such as large landslides along the basin margins or even submarine landslides. Large seiche waves in San Francisco Bay from either source are unlikely; however, any such occurrence probably would have the same or less effect than that from tsunamis (Harding-Lawson Associates, 1976).

HYDROLOGY AND WATER QUALITY

The proposed project requires changes to site drainage systems that can alter the pattern and chemical composition of runoff water. Such changes, however, would not appreciably alter the peak or total characteristics and quality of runoff water from existing conditions.

VEGETATION AND WILDLIFE

The proposed project would result in a complete disruption of existing vegetation and wildlife use of the site. No impacts are anticipated with respect to rare, endangered or protected plant or animal species.

AIR QUALITY*

Automobile usage associated with the proposed parking structure would cause a degradation in local air quality from primary pollutant emissions. In order to assess the emissions effect of the project, the study area was mathematically modelled using the same model as was used in modelling existing conditions described in the Environmental Setting section of this report (page 12). The results of this modelling effort are shown in Figure 14, and indicate that the highest one hour averaged CO concentrations expected in the study area under worst conditions would be 25 ppm while the California Air Quality Standard is 35 ppm (Ultrasystems, 1976).

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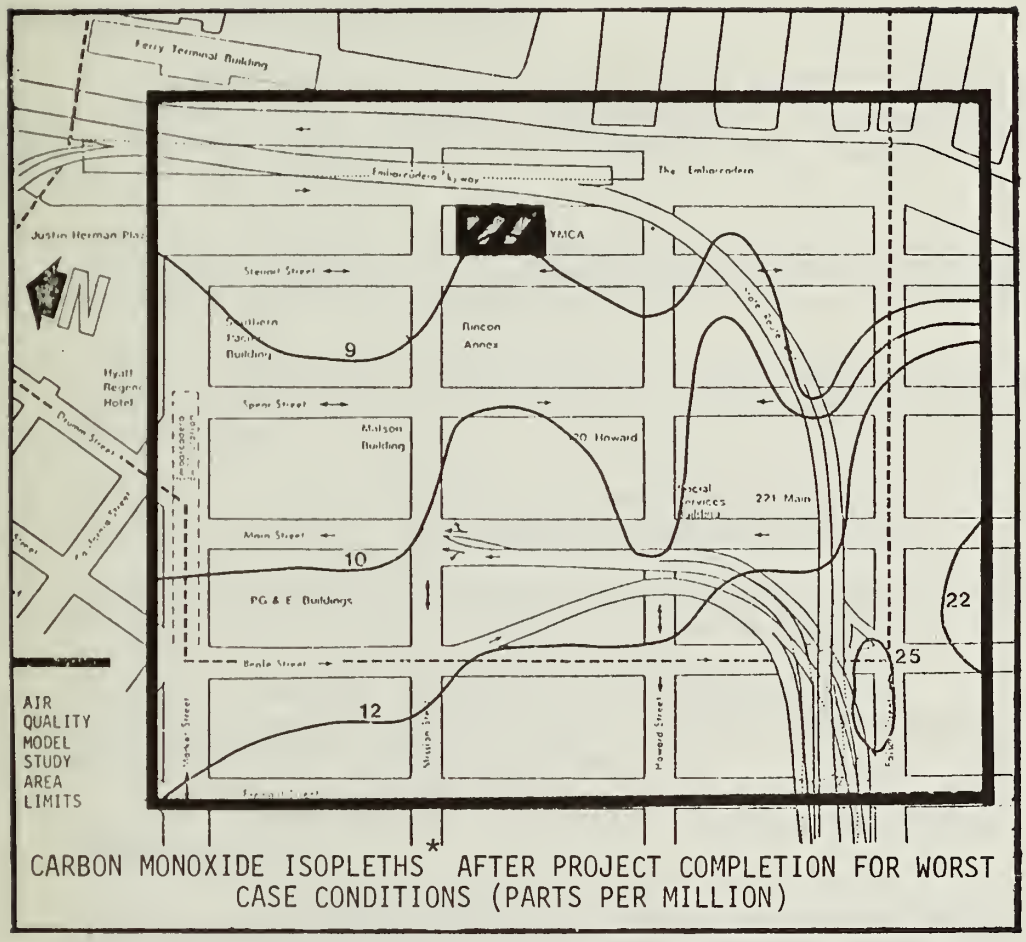
* This section draws heavily on Ultrasystems (1976) (Appendix B). Refer to footnote * on page 14 for a discussion of modelling techniques employed, assumption, and limitations.



Source: Ultrasystems, 1976

* An Isopleth is a line connecting points that have equal or corresponding values. By comparison to Figure 6, page 15, model results indicate a slight improvement, a result of improved emission factors projected for automobiles in future years.

FIGURE 14

LOCAL CO IMPACT WITH PROJECT

Secondary pollutant impacts would result from the formation of Oxidant which would contribute to increased oxidant levels in areas downwind of the project area (e.g., Livermore, Fremont) resulting in a general degradation of air quality. The project would contribute to emissions in the entire air basin; the cumulative impact of this and other projects in the air basin that contribute emission sources may result in ambient air quality standards being exceeded.

CIRCULATION, TRAFFIC, AND PARKING*

The proposed project would be located just outside the downtown core as defined in the "Plan for Transportation." The unpublished report, "Parking in San Francisco,"** December 1975, suggests seven policies for the downtown:

Policy 1 (Department of City Planning) - Short-term parking facilities should be in convenient locations near or adjacent to but not within the downtown core.

Policy 1 (Department of Public Works) - Short-term parking facilities should be located in locations convenient to serve the downtown core.

Policy 2 - Limit the location of long-term parking facilities to areas peripheral to the downtown commercial district.

Policy 3 - Encourage conversion of existing all day commuter parking to short-term parking in areas of high demand.

Policy 4 - Encourage conversion of existing long-term (basically commuter) parking to car/van pool parking where short-term parking demands are low.

Policy 5 - Discourage new parking lots in the downtown commercial district.

Policy 6 - Limit the location of drive-in and auto-oriented uses to sites outside the existing and projected concentrated office, retail and general commercial districts of downtown.

Policy 7 - Provide "fringe" parking at appropriate locations to intercept auto trips destined for downtown or other major activity centers and provide shuttle transit to complete the trips.

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* This section draws heavily on a report by Goodrich (1976) (Appendix A).

** It is expected the Comprehensive Plan will be amended to incorporate the policies and programs set forth in "Parking in San Francisco," developed by the San Francisco Departments of Public Works and City Planning.

Transit Services and Ridership. The garage would not conflict with the operation of existing or improved transit services except that the added automobile traffic might increase street congestion, slowing public transit and possibly deterring people from using it. The commercial use portion of the project would generate about twenty transit trips per day (Goodrich, 1976).

The long-range impact on transit ridership would depend primarily on the amount of additional parking provided by both the proposed project and in areas adjacent to it. With the anticipated growth of 11,000 jobs in northeastern San Francisco by the year 2,000 (Department of City Planning, 1976), this garage alone would have a limited impact on transit patronage (Goodrich, 1976). However, the cumulative growth in parking facilities (both in garages such as this and as a part of new office buildings) could have a measurable impact on transit. Given the policy that new office buildings may devote no more than seven percent of their total floor space to parking (Departments of City Planning and Public Works, 1975), a substantial net increase in transit patronage would be anticipated (Goodrich, 1976).

Traffic Generation and Circulation. The demolition of the existing buildings on the proposed project site would remove transit trips which would equal 50 percent of the transit generation of this project (Goodrich, 1976).

The number of trips generated by the garage for special events at the proposed Yerba Buena Sports Center would be limited because of the availability of parking space closer to the Center, which is approximately 3/4 of a mile from the proposed garage (Goodrich, 1976).

Intersections in the immediate vicinity of the proposed garage are operating at between 40 to 50 percent of capacity. Traffic generated by the garage would increase this by three percent during the evening peak hour.

If the Embarcadero Roadway is reconstructed as proposed, the forced closure of Howard and Steuart Streets where they meet the roadway would cause some rerouting of traffic. The critical intersection with respect to the proposed garage is at Mission and Steuart Streets. This intersection is presently operating at 34 percent of capacity (Service Level "D"). Projected traffic growth to 1985 (Department of Public Works, 1970), would bring this intersection to 46 percent of capacity. Traffic that is forcibly rerouted by the proposed Embarcadero Roadway project would increase this another five percent.

The impact of the proposed project on street capacity due to street blockage from truck or pedestrian loading would be limited. For ease of flow and minimization of flow conflict from the garage onto Steuart Street, the curb from the garage access to Mission Street would be marked loading zone yellow to alleviate any possible problems.

Pedestrian/Bicyclist Circulation. Temporary impact of the proposed project on pedestrian and bicycle accessibility would occur during the

construction period. When completed, the garage would not displace any pedestrian walkway or bicycle path. The existing sidewalk widths on both The Embarcadero and Steuart Street would be sufficient to accommodate the added pedestrian traffic generated by the project. Present street widths and traffic volumes do not pose a hazard to bicycle traffic (Goodrich, 1976).

Parking. The elimination of 16 curb parking spaces on Steuart Street and seven spaces on The Embarcadero would effectively broaden the existing right-of-way and provide more traffic capacity. These 23 spaces along with the 37 on-site spaces now provided in surface parking effectively reduce the net increase in parking spaces associated with the project from 475 to 415. This assumes that the additional traffic diverted to Steuart Street if the Embarcadero Roadway is redesigned would result in a need to eliminate perpendicular parking now allowed in in front of the YMCA (Appendix A, page 70). If the mid-portion of the parking area of the proposed garage were striped for compact cars, about 25 additional spaces would result (refer to "Different Parking Arrangement" alternative discussion on page 51).

The proposed project would help to satisfy the projected 600 space unmet parking needs in the study area by 1977, when the proposed structure would possibly be open (De Leuw, Cather and Company, 1975). If proposed office buildings in the area are completed, additional parking needs would occur in the future.

NOISE

Noise generated by the proposed project can be divided into two categories: temporary demolition and construction noise and permanent operational noise.

During the approximately one-year construction period, additional noise would be introduced into the area from demolition of existing buildings, trucks that would be removing rubble and bringing in new building materials, and from construction equipment employed in driving foundation piles, etc.

Additional truck traffic should not raise the median noise levels experienced along haul routes by perceivable amounts (i.e., more than about 1 dBA). Noise from equipment used in demolition and construction of the new structure could result in noticeable increases in noise levels in the vicinity of the site, with pile driving noise expected to be the most noticeable.

The noise levels typically associated with different types of construction equipment at a distance of 50 feet are shown in Table B. For comparison, Figure 15 presents information describing typical noise levels encountered in urban environments. Noise levels from point sources decrease by about 6 dBA for each doubling of distance from the source if no intervening barriers exist (Bolt, Beranek and Newman, 1973). Therefore, construction noise would be most noticeable to passersby on adjacent streets or to occupants of buildings within a block of the site. Background noise from traffic would screen construction noise at greater distances.

Once completed, the main source of noise associated with the proposed project would be the additional automobile traffic it generates. The largest increase induced by such traffic would be on Steuart Street near the entrance to the structure. Because of the pervasive effect of noise generated by traffic on the Embarcadero Freeway, the increase in noise from increased traffic on Steuart Street would not be perceivable.*

LAND USE

The project, if implemented, would result in the demolition of the four buildings presently located on the proposed site, the substitution of 475 parking spaces for the 38 existing off-street parking spaces, the elimination of two hotels with 246 rooms, and the substitution of 18,000 square feet of retail commercial shop space for approximately an equivalent amount of space now used for a variety of commercial uses (Figure 7).

The average height, about 70 feet, and bulk of the proposed structure would be greater than the average height and bulk of buildings now at the site; it would not be as high as the eight-story YMCA immediately adjacent to the south. Adjacent land uses would not be directly affected by the proposed project with the exception of additional traffic attributable to the proposed project. The project could encourage other property owners to upgrade the condition of other structures in the area or to seek approval to demolish existing, older facilities and construct new facilities. The provision of commercial uses on the ground level would promote City policy concerned with making multiple use of downtown land.

POPULATION

The proposed project would displace an estimated 192 permanent occupants of the site (242 rooms x .80 occupants) (Victoria, 1976) and an estimated 45 employees of businesses now located on the site. The project would substitute new commercial employment estimated by the Project Design Consultant on a square footage basis to be from 48 to 63 persons. The net effect on the population of Census Tract 176 would be to reduce the permanent population by about 4 percent from existing levels. It is possible that some displaced permanent residents would wish to relocate within the census tract, thus reducing this impact.

The impact of the proposed project on transient population would be to increase the number of persons attracted to the site by about 276**; the proposed project does not displace any pedestrian walkways in the area except during construction, and prevailing sidewalk widths are sufficient to handle the added pedestrian traffic generated (Goodrich, 1976).

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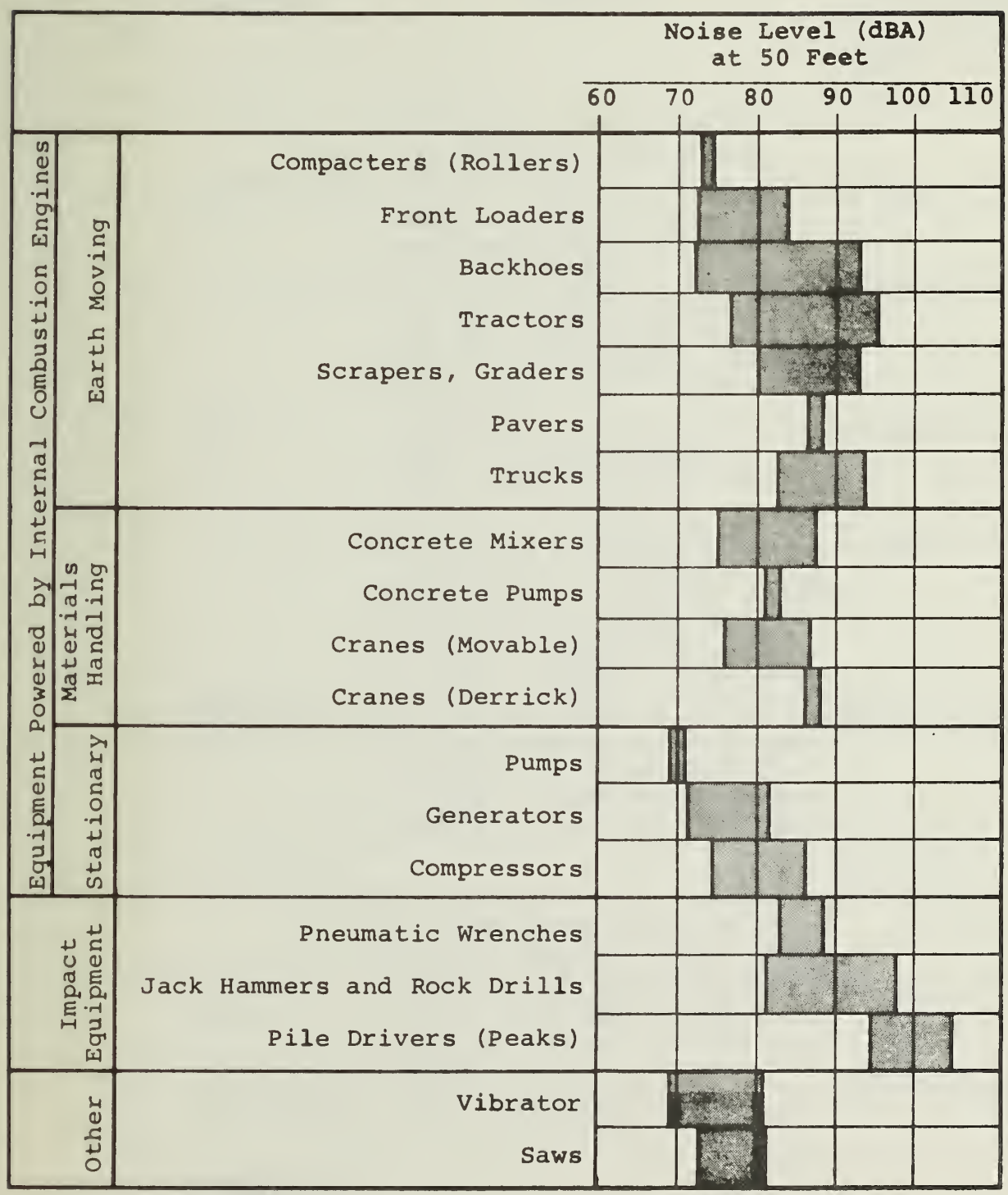
* Calculations on file with Department of City Planning.

** Based on an impact analysis of the proposed project prepared by Captain George Sully, San Francisco Police Department, on file with the Department of City Planning.

TABLE B

CONSTRUCTION EQUIPMENT NOISE LEVELS



Source: Bolt, Beranek and Newman (1971)

FIGURE 15

TYPICAL COMMUNITY NOISE LEVELS

NOISE LEVEL (dBA)	SUBJECTIVE IMPRESSION	COMMUNITY* (Outdoor)	RELATIVE LOUDNESS (Human Judgment of different sound levels)
130			32 times as loud
		Military jet aircraft takeoff with afterburner from aircraft	
120	Uncomfortably	carrier at 50	16 times as loud
	Loud	Turbofan aircraft at takeoff power under flight path at	
110		200 feet (118 dBA)	8 times as loud
		Same jet flyover at 1000 ft. (103 dBA). Boeing 707, DC-8 at 6,080 ft. before landing (106 dBA). Bell J-2A helicopter at 100 ft.	
100	Very	(100 dBA)	4 times as loud
	Loud	Boeing 737, DC-9 at 6,080 ft. before landing (97 dBA).	
90		Motorcycle at 25 ft. (90 dBA)	2 times as loud
		Car wash at 20 ft. (89 dBA). Prop plane flyover at 1,000 ft. (88 dBA) Diesel truck, 40 mph at 50 ft. (84 dBA). Diesel train, 45 mph at 100 ft. (83 dBA). Power mower	
80	Moderately	at 25 ft. (85 dBA).	Reference Loudness
	Loud	High urban ambient sound (80 dBA) Passenger car, 65 mph at 25 ft. (77 dBA). Freeway at 50 ft. from	
70		pavement edge 10 a.m. (76=6 dBA)	1/2 as Loud
60			1/4 as Loud
		Air-conditioning condensing unit at 15 ft. (55 dBA). Large trans-	
50		formers at 100 ft. (50 to 60 dBA)	1/8 as Loud
	Quiet	Bird calls (44 dBA). Lower-limit urban daytime ambient noise	
40		(40 dBA)	1/16 as Loud
	Just Audible	(scale interrupted)	
10			
	Threshold of Hearing		
0			

* Table A - NOISE LEVEL AND RELATIVE LOUDNESS OF TYPICAL NOISES IN INDOOR AND OUTDOOR ENVIRONMENTS

Source: Beranek, 1971.

HISTORY AND ARCHAEOLOGY

Although it is believed that the site is of no historical or archaeological significance, it is possible that remains of sunken ships would be encountered during the construction of the foundation system for the project (Soeten, 1976). Possible effects of construction on the adjacent Audiffred Building have been evaluated by the project sponsor's structural engineers who have concluded that the likelihood of any damage would be minimal (DeLeuw, Cather and Company, 1976c).

VISUAL AND AESTHETIC CONDITIONS

The average height and bulk image presented by the proposed structure would be greater in both respects than existing structures on the site. Compared to the adjacent elevated freeway structure, the proposed building would be slightly taller and the top one or two of its parking levels would be seen by passing motorists at close range. The existing Rincon Annex Post Office accross Steuart Street reaches approximately the same height as the proposed building so only minor view blockage would result (Figure 16). The proposed structure would also cast a shadow on the adjacent portion of the elevated freeway during the afternood, a shadow of greater extent than that cast by the existing 6-story building that occupies a portion of the site presently. Figure 16, a photograph taken from the sixth floor of the 120 Howard Building, indicates that View blockage of the bay from existing inland vantage points would not be impaired by the proposed project because other existing buildings and the Embarcadero Freeway structure block most of the view. view.

COMMUNITY SERVICES AND UTILITIES*

Police Protection. The San Francisco Police Department Planning and Research Bureau (1976), using Census Tract 176 as a base, estimates that the project would result in an increase of about 12 incidents for which a police report would be made in a 12-month period (Sully, 1976). This would represent about a 0.003 percent increase over levels presently experienced in the census tract.

Fire Protection. Water supply for firefighting in the area of the proposed project would be adequate. The San Francisco Fire Department does not anticipate that this project would have any adverse effect on the Fire Department from a firefighting standpoint (Rose, 1976).

Energy/Gas and Electricity. The project, as proposed, would utilize electricity as a source of energy and would require no fossil fuel or natural gas as energy sources. 120/208 volt electrical service would be taken from existing distribution facilities in Steuart Street and installed in accordance with PG&E rates and rules on file with the California Public Utilities Commission in effect at the time service is established. A subsurface transformer would be installed in a vault beneath the sidewalk on the Steuart Street side of the project (Podesta, 1976 and 1975). Antici-

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* Correspondence and reports concerning the impact of the proposed project on City departments and agencies that would provide services to the project are on file with the Department of City Planning. Specific references to sources of information in this section are to Bibliography entries.

FIGURE 16

DIAGRAM OF VIEW BLOCKAGE

(AS VIEWED FROM THE SIXTH
FLOOR OF THE 120 HOWARD BUILDING)

pated energy requirements would be as presented in Table B, which distinguishes between requirements for parking area and commercial area usage. Figure 17, page 44, portrays annual and daily fluctuations in energy requirements.

Water. Water consumption, assuming 30 gallon/employee/day, would be approximately 1,900 gallons/day (63 x 30 = 1,890). The San Francisco Water Department indicates that it would be able to furnish adequate water for all normal fire and domestic needs of the proposed project. This service would be provided without need to improve the existing distribution system provided that service is taken from the existing 12-inch Steuart Street main (Kenck, 1976).

Sewer. The San Francisco Department of Public Works indicates that the proposed project would not be in conflict with any sewer projects presently scheduled. However, there is a possibility of new sewer construction on Steuart Street between Mission and Market within the next few years which would require coordination of construction plans and schedules. The construction of the proposed structure would not overload the sewer system nor would it result in the need to acquire additional city personnel (Tatarian, 1976). Because the proposed project would eliminate the hotel usage of a part of the site, it is likely that there would be a net decrease in sewage generation from the site.

Solid Waste. Solid waste would be produced from demolition of existing structures on the site and during the construction of the proposed project. This waste material would be removed by truck to a disposal site as yet not selected. It is also probable that some materials in the structures to be demolished may be reclaimed and sold as used building materials (e.g., brick), although economic considerations would dictate whether the entire building is demolished quickly or whether it is dismantled piece by piece and salvaged for resale.

Waste generated during the operation of the facility would be collected and ultimately transported to the Mountain View Sanitary Land Fill by the Golden Gate Disposal Company. Based on solid waste generation factors developed by the California Solid Waste Management Board (1974), the volume of solid waste generated by the project would be approximately 2,810 tons/year.*

ECONOMIC CHARACTERISTICS

If implemented, the project would be owned by the San Francisco Central City Parking Corporation, a public entity. Therefore, the present property tax revenue of $17,032 derived from private owners of the site would be lost. According to Coldwell Banker (1975), this revenue loss would be offset by a possessory interest tax that would be levied on

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* Calculated as follows: commercial space - 18,000 square feet x 1 pound/square foot/day x 312 (52 x 6) ÷ 2000 = 2,808 tons/year. Garage - assume 500 feet roadway/level x 6 levels = 3000 foot roadway ÷ 5280 = 0.56 miles roadway x 4 tons/mile/year = 2.2 tons/year. 2,808 + 2.2 = 2,810.2 tons/year.

TABLE C

ENERGY CONSUMPTION FACTORS[1]

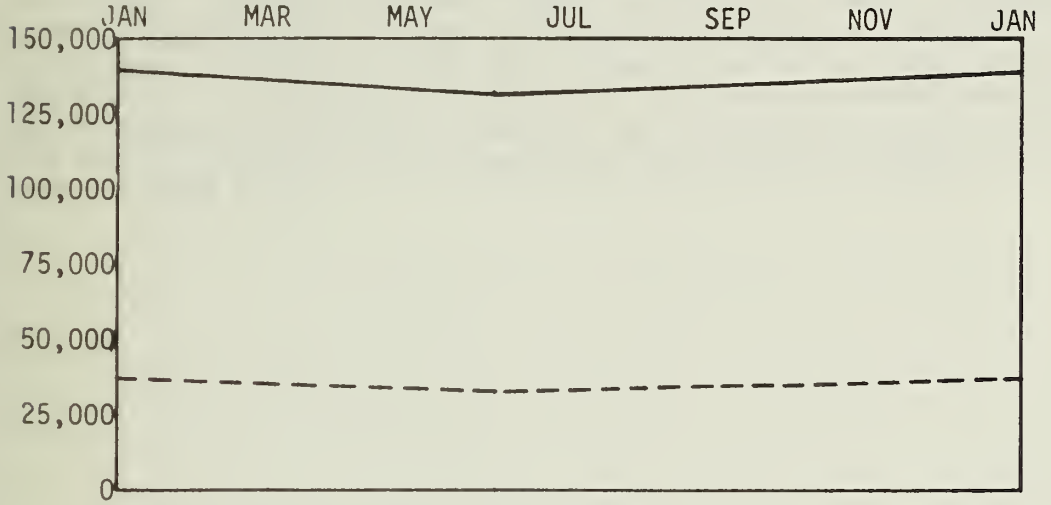
CONSUMPTION FACTOR	LEVEL OF CONSUMPTION[1] GARAGE	COMMERCIAL	TOTAL
1. CONNECTED KILOWATT LOAD (KW)	125	420	545
2. AVERAGE MONTHLY CONSUMPTION (KWH/MONTH)	33,000	85,800	118,800
(KWH/SQ.FT./MONTH	0.179	4.766	4,945
3. DAILY AND ANNUAL ELECTRIC LOAD DISTRIBUTION	(SEE FIGURE 15)		
4. FOSSIL FUEL CONSUMPTION	N/A	N/A	N/A
5. PEAK FOSSIL FUEL CONSUMPTION	N/A	N/A	N/A
6. DAILY AND ANNUAL NATURAL GAS LOAD DISTRIBUTION	N/A	N/A	N/A
7. STATE ALL ASSUMPTIONS[1]			

Notes:

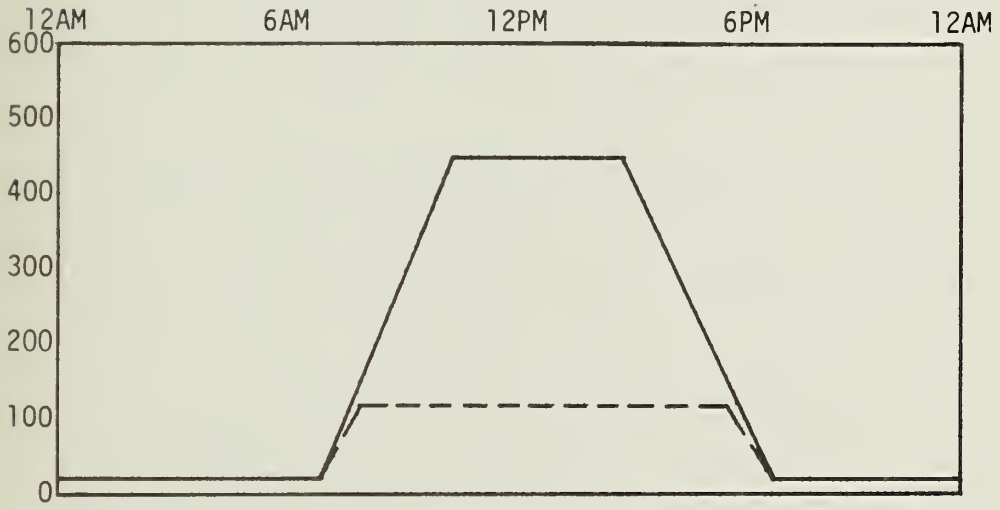
1) Energy consumption projections prepared by project design consultant; calculations projecting energy consumption levels, and assumptions related thereto are on file with the Department of City Planning.

FIGURE 17

MISSION-EMBARCADERO PARKING GARAGE
ANTICIPATED DAILY AND MONTHLY ELECTRICAL LOAD DISTRIBUTION CURVES



MONTHLY ELECTRICAL USE (KWH/MONTH)*



DAILY ELECTRICAL DEMAND (KW)

——— = Total Project
----- = Garage Only

* Although the connected load for electric heat would indicate a substantial portion of the electrical energy would be affected by its use, the occupant load and the lighting load will provide a large part of the heating requirement and this coupled with the need for air conditioning in the commercial spaces tend to flatten the curve.

private lessees by the parking corporation. The possessory interest tax* would be based on the increased value of the proposed project and would be set by the project sponsor at a level to at least offset lost revenue from existing property taxes.**

A cost, revenue, and expense analysis for the project prepared by the design consultant (DeLeuw, Cather and Company, 1975) indicates the project would require a first year operating subsidy of $271,000; subsequent years operating subsidy is expected to be on the same order of magnitude. The revenue to provide this subsidy would come from parking meter revenue, specifically from that part of meter revenue from increasing rates in the Central Business District and adjacent areas (off-street parking trust fund).

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* A possessory interest tax is a tax whereby publically owned (tax exempt) facilities that are used by private enterprise (taxable) pay additional fees in lieu of property tax so that tax burdens are more equitably distributed.

** A detailed analysis of this subject requires a complex calculation requiring input data such as length of lease, quality of tenant, etc., not presently available.

V UNAVOIDABLE ADVERSE IMPACTS

The unavoidable adverse environmental impacts of the proposed project are:

- The proposed project would generate emissions that would contribute to air pollution levels in the air basin.
- The proposed project would increase noise levels during demolition and construction that would be perceivable by residents and tenants of nearby structures.
- The proposed project would result in the dislocation of about 182 tenants who occupy existing structures on the proposed project site.
- The proposed project would result in demolition of four buildings that are serviceable.
- The proposed project would increase automobile traffic and pedestrian levels in the area. 1,190 autos would be added to adjoining streets over a 24-hour period.
- The proposed project site would be exposed to geologic hazards.
- The proposed project would block the view of the Bay for tenants of office buildings to the west to a greater extent than the view interruption that presently occurs.
- The proposed project would increase the demand for community services and utilities.

VI MITIGATION MEASURES

SOIL AND FOUNDATION INVESTIGATION

A soil and foundation investigation would be performed to identify subsurface conditions that could adversely affect structures during earthquakes. Foundation design recommendations, including driven pile design criteria, would be developed that would reduce potential earthquake hazards. Earthquake-resistant design would reduce the probability of structural damage or damage to utilities and pavement in case of an earthquake.

PILE FOUNDATION SYSTEM

Damage to the structure from ground shaking would be reduced by the use of a pile foundation system. Vibration monitoring studies undertaken by the project sponsor's geotechnical engineering consultant for pile driving operations during construction at a site two blocks away from the proposed project site indicate that damage would not be expected to occur to adjoining structures from pile driving operations (Harding, Miller, Lawson and Associates, 1971*).

LANDSCAPING

The street trees and other vegetation now found on the site would be replaced with new street trees.

POPULATION DISLOCATION COMPENSATION

Persons displaced by the proposed project would be provided assistance in relocation by the San Francisco Central City Parking Corporation. Relocation services would be obtained by the Parking Corporation from another city agency, Central Relocation Services which operates as a part of the San Francisco Redevelopment Agency. The extent of assistance would be determined on a need basis based on negotiation between the Parking Corporation, Central Relocation Services, and the affected parties.

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* Report on file with Department of City Planning, Office of Environmental Review.

RECONSTRUCTED EMBARCADERO ROADWAY*

Implementation of the redesigned Embarcadero Roadway would increase traffic on The Embarcadero and necessitate the rerouting or diversion of some existing traffic. The access/egress design of the proposed project is such that The Embarcadero ingress to the garage could be closed and no access permitted except for emergency vehicles, such as fire trucks and ambulances. The Steuart Street entrance/exit would be sufficient to accommodate the need.

Because of the redesigned Embarcadero Roadway, traffic volume on Steuart Street could increase by as much as 1,000 vehicles during the 4 to 6 p.m. peak period. Such an increase could be handled by prohibiting peak hour parking in front of the YMCA on Steuart Street as well as in front of the proposed garage as is proposed. As a consequence, an additional 20 perpendicular parking spaces would be displaced during the peak hours. Conversions of these perpendicular parking spaces to parallel spaces during the off-peak periods would displace 13 more parking spaces. Implementation of these parking changes on Steuart Street would be accomplished by a written request from the project sponsor to the Director of the Department of Public Works who would analyze the request, consult with affected City departments, conduct a public hearing, and make a recommendation to the Board of Supervisors.

INGRESS/EGRESS FLOW MITIGATION

To minimize flow conflicts from the garage onto Steuart Street, yellow curbing is proposed on both The Embarcadero and Steuart Street north of access points to the garage. Yellow curbing is accomplished by contacting the Director of the Department of Public Works requesting the designation. A full description of the location must be provided. The Department of Public Works studies the designation request including referral to the San Francisco Police Department if relevant, makes a recommendation, and a hearing is held.

NOISE

The San Francisco Noise Ordinance (Police Code, Article 29) makes it unlawful to operate equipment that emits noise at a level in excess of 85 dBA at a distance of 100 feet. Thus, noise reduction measures for the noisier types of construction equipment (e.g., pile driver) would be necessary.

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* Study of the redesigned Embarcadero Roadway proposal was undertaken by the Department of City Planning, in cooperation with other affected agencies, at the direction of the San Francisco Board of Supervisors (Resolution No. 828-73 adopted December 10, 1973). The study identified possible funding sources but also indicated that not all of the participating agencies in the study group agreed that the necessary funds should be expended in the manner indicated. The proposal is evaluated here because of its effects on the circulation system in the vicinity of the proposed project site should it be implemented. If implemented, the proposal would probably be initiated by the City in cooperation with the federal and state transportation agencies with funds primarily from federal sources.

HISTORY AND ARCHAEOLOGY

Should evidence of potential historical or archaeological significance be uncovered at the site during construction, the contractor would be required to halt construction activities until a qualified archaeologist could determine the significance of the evidence and take appropriate measures.

BICYCLE PARKING

Although the proposed project plans do not make provisions for bicycle parking, discussions with the project sponsor indicate a willingness to consider providing bicycle parking outside or inside the structure. If bicycle parking were to be included inside the structure, consideration would be given to providing free racks or paid lockers.

ENERGY CONSERVATION

For the garage portion of the project, there is no heating or cooling required. Therefore, the only opportunity for energy savings is in the lighting system, for which high pressure sodium lamps would be used, an efficient means of lighting.

Detailed designs have not yet been made for the commercial space in the proposed project because specific occupancies are not as yet determined. Consideration during design will be given to energy saving devices such as heat pumps.

DEMOLITION

Details concerning the method of demolition and removal of material have not yet been determined. When the demolition program is developed, consideration would be given to factors such as minimization of street blockage, control of dust, safety, routing of haul trucks, and potential conflicts with peak hour traffic.

ADJOINING BUILDINGS

Elimination of a basement as a part of the proposed new construction, adherence to the provisions of Section 832 of Deering's Civil Code, which relates to notice to adjoining property owners and spells out responsibilities, adherence to careful design and construction procedures, and having the flexibility of adjusting the new work to minimize disturbance to existing conditions would, in the opinion of the project sponsor's structural engineers*, reduce the likelihood of damage to adjoining structures. However, during construction adjacent to existing buildings, there is always the possibility of damage occurring due to conditions unknown or unforeseen.

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* Richard B. Gould, S1439; Burton A. Lewis, S1209.

VII ALTERNATIVES TO THE PROJECT

NO PROJECT

The alternative of no project would eliminate the long-range impact of increased traffic resulting from the cumulative effect of additional parking capacity in the downtown area. No displacement of existing businesses and tenants occupying the site would occur. At present the buildings on the site are usable, although as previously noted, some of the buildings have recently been required to make improvements to avoid condemnation proceedings because of public health and safety problems.

SMALLER FACILITY

A parking facility with lower height and less parking spaces would make the project economically undesirable, according to the design consultant (DeLeuw, Cather and Company, 1976a), because the ratio of fixed costs (eg. land) to number of parking spaces provided would increase. Such a structure would proportionately lessen the environmental impacts of the project as a result of lower traffic intensity, lower energy consumption, and lower construction cost. A smaller facility would require a structure of less height than the one proposed that would lessen the view impact. It is possible that a lesser subsidy could result, although fewer parking spaces would be provided.

DEVELOPMENT OF PROJECT AT ANOTHER LOCATION

The project design consultants conducted a survey of the downtown area south of Market Street in conjunction with the Coldwell Banker Company and have been unable to find other sites which can feasibly attain the objectives of this project (DeLeuw, Cather and Company, 1976a). Because of the limitations on the minimum size site (satisfaction for an efficient parking structure - 130' by 130') and high cost of land in the Central Business District, no other suitable sites were located despite extensive efforts. At the same time as the current site was considered, another site was also pursued - the northwest corner of Sansome and Washington. The project sponsor met with the Planning Department and, at first, was encouraged about the Sansome and Washington property, but subsequently the Planning Department indicated it did not favor a parking structure at the location and the site was dropped from further consideration. Were a feasible alternative site available, the environmental impacts on this site would be the same as in the "no project" alternative. The impacts on the alternate site and vicinity would be similar to those at this site except for those features which would be derived from the particular location and traffic features of the alternate site.

PROJECT WITHOUT COMMERCIAL UNITS

The proposed 18,000 square feet of leasable space for retail sales and commercial enterprises would provide relocation opportunities for

those existing businesses that would be displaced by the project although during the construction period they would have to relocate in another area. Without the commercial units, The Embarcadero and Steuart Street would offer fewer pedestrian amenities and would eliminate the potential relocation opportunities for existing businesses on the site. With elimination of the commercial space, the height of the building could be reduced and the overall cost could be reduced. However, elimination of the commercial space would result in less revenue which would result in a need for a greater subsidy from parking meter revenue. Energy consumption levels would be substantially reduced by elimination of the commercial use, since most of the facility's energy consumption requirements are attributable to the commercial space. If commercial space was eliminated, city policy promoting mixed use in parking facilities would not be met.*

OTHER USES

The site is located in a C-3-O (Downtown Office) Zoning District and could be used for an office building, or other commercial use with floor space up to 14 times the lot size, subject to height and bulk limitation of the 84-E District. The use could incorporate retail or other support commercial uses and short-term parking facilities occupying up to 7 per cent of the gross floor area (Section 116.2, City Planning Code). Impacts of such a project would be a great concentration of transient population and a taller structure. Depending on the occupancy, the attendant impacts of community service and utility needs could be greater than with the proposed project. Additional office space might also generate further demand for parking in the area.

DIFFERENT PARKING ARRANGEMENT

The mid-portion of the parking area within the structure could be striped differently to set aside additional space for the parking of compact autos. If this were done, the total number of spaces available would increase by about 25. Provision of compact-only parking spaces might contribute to encouragement of the use of smaller, more efficient automobiles which in turn would tend to incrementally reduce air pollution and fuel consumption, but would increase the number of autos.

GASOLINE STATION/GARAGE SERVICE

The ground floor of the proposed structure could include an automotive services center. Such a use was considered by the project sponsor's design consultant in the initial planning stages but was found not to be an economically viable use of space. Impacts of a gasoline station/garage service area would be to complicate garage circulation by requiring separate storage areas, slowing entry and egress, creating a need for full storage facilities and reducing the ground floor area available for retail commercial space. The delay in ingress/egress could increase the idling time of autos in the facility, resulting in more pollutant emissions. In addition, pollutant runoff from a garage service facility would probably result in more pollutants in surface runoff.

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* City policy as stated by Janis Birkeland, Head of Project Review Section, Department of City Planning.

CONVERTIBILITY TO OFFICE SPACE

The design of the garage portion of the structure could be modified so that the parking area could be converted to office space if parking demand decreases. A complete redesign would be necessary since the sloping ramp floor and low ceilings required for an efficient parking structure on this site could not readily be converted to office space. A revised design to provide for such a conversion would increase the per unit (parking space) cost of the facility since separate ramping between all parking levels would be required. Inspection of Figure 3, page 6 indicates that if a separate circular ramp system were provided, the total number of parking spaces would be reduced by about one-third. Alternately, to provide the same number of spaces as is now proposed, a taller structure would be necessary, requiring a change in the height limit.*

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* A change in the height limit could be proposed to the City Planning Commission and, if approved, passed on to the Board of Supervisors for action.

VIII THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Delay in development of the proposed project would permit present owners to consider other uses for their buildings, or would permit building remodeling and improvements, in which case a sufficiently long length of time would be necessary to allow for amortization of investment capital before changing the use.

Delay might reduce or eliminate the need for the proposed project in view of societal pressures to reduce the use of automobiles.

IX ANY IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Once developed, reversion of the site to its previous state would be impossible. Non-renewable energy and material resources would be expended during and after construction. Also irreversible is the local and regional commitment of increased services which are necessary to the project.

X THE GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

The proposed parking garage would attract an estimated 576 people to the site, which would represent a daytime population growth, but would reduce resident population within Census Tract 176 by an estimated 182 persons, who are tenants of the two hotels on the site. The project could intensify further development of the area as it may encourage other property owners to develop their properties.

XI DISTRIBUTION LIST

REGIONAL

Bay Area Air Pollution
Control District
939 Ellis Street
San Francisco, CA 94109
Attn: Ralph Mead

Association of Bay Area
Governments
Hotel Claremont
Berkeley, CA 94705
Attn: Vivian Brown

SAN FRANCISCO

Human Rights Commission
1095 Market Street, Room 501
San Francisco, CA 94103

Committee for Utility Liaison
on Construction and Other
Projects (CULCOP)
c/o GES - Utility Liaison
City Hall, Room 363
San Francisco, CA 94102
Attn: Herman Beneke

Public Utilities Commission
949 Presidio Avenue
San Francisco, CA 94115
Attn: James J. Finn,
Director of Transportation

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Stanford University
Stanford, CA 93063

Environmental Protection Agency
100 California Street
San Francisco, CA 94111
Attn: Jean Circiello

NEWSPAPERS

San Francisco Chronicle
925 Mission Street
San Francisco, CA 94103
Attn: Dale Champion

San Francisco Bay Guardian
2700 - 19th Street
San Francisco, CA 94103
Attn: Ken McEldowney

San Francisco Progress
851 Howard Street
San Francisco, CA 94103
Attn: Dan Borsuk

San Francisco Examiner
110 Fifth Street
San Francisco, CA 94103
Attn: Don Cantor

Oakland Tribune
13th and Franklin
Oakland, CA 94612
Attn: Fred Garretson

ORGANIZATIONS

San Francisco Tomorrow
728 Montgomery Street
San Francisco, CA 94111
Attn: Susan Smith

ORGANIZATIONS (continued)

Sierra Club
San Francisco Bay Chapter
5608 College Avenue
Oakland, CA 94618

Friends of the Earth
529 Commercial Street
San Francisco, CA 94111
Attn: Connie Parrish

Northern California Committee
for Environmental Information
P. O. Box 761
Berkeley, CA 94701
Attn: Donald Dahlsten

San Francisco Beautiful
840 Urbano Drive
San Francisco, CA 94127
Attn: Henry Heyl

San Francisco Maritime Museum
Foot of Polk Street
San Francisco, CA 94109
Attn: Harlan Soeten, Curator

San Francisco Ecology Center
13 Columbus Avenue
San Francisco, CA 94111

San Francisco Junior Chamber
of Commerce
24 California Street
San Francisco, CA 94111

Greater San Francisco
Chamber of Commerce
465 California Street
San Francisco, CA 94104

San Francisco Planning and
Urban Renewal (SPUR)
126 Post Street
San Francisco, CA 94108
Attn: Redmond Kernan

Women in Construction
c/o Prim Investments
650 California Street, Suite 2900
San Francisco, CA 94108

San Francisco Convention
and Visitors Bureau
Fox Plaza, Suite 260
San Francisco, CA 94102

Downtown Association
582 Market Street
San Francisco, CA 94104

Bay Area Women's Coalition
944 Market Street
San Francisco, CA 94102

Junior World Trade Association
465 California Street
San Francisco, CA 94104

BUSINESSES

Pacific Gas and Electric Company
Land Department
77 Beale Street
San Francisco, CA 94105
Attn: Melvin Youngblood

INDIVIDUALS

James M. Flack II
708 Montgomery Street
San Francisco, CA 94111

Richard Ekman
One Embarcadero Center, #1809
San Francisco, CA 94111

Rod Freebairn-Smith
300 Broadway
San Francisco, CA 94133

XII EIR AUTHORS, CONSULTANTS, AND BIBLIOGRAPHY OF ORGANIZATIONS, PERSONS AND REFERENCES CONSULTED

EIR AUTHOR

San Francisco Department of City Planning
100 Larkin Street
San Francisco, CA 94102
Environmental Review Officer: Dr. Selina Bendix
Coordinator: Ralph Gigliello

AUTHORS OF PRELIMINARY DRAFT EIR

Leighton and Associates, Inc.
Report Coordination and Production
620 Price Avenue
Redwood City, CA 94063
Coordinator: Larry Seeman

Donald K. Goodrich
Transportation and Traffic Engineering Analysis
2147 Judah Street
San Francisco, CA 94122
Coordinator: Donald K. Goodrich (C12135)

Ultrasystems, Inc.
Environmental Technology Department
Air Quality Modeling Analysis
2400 Michelson Drive
Irvine, CA 92715
Coordinator: Vincent Mestre

Harding-Lawson Associates, Inc.
Geotechnical Hazards and Impact Analysis
155 Montgomery Street
San Francisco, CA 94104
Coordinator: Frank L. Rollo (C18126)
Coordinator: Stephen R. Korbay (CEG916)

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APPENDIX A

TRANSPORTATION ANALYSIS REPORT

TRANSPORTATION ANALYSIS

EMBARCADERO-MISSION GARAGE EIR

Prepared for:

Leighton and Associates
620 Price Avenue
Redwood City, California 94063

Prepared by:

D. K. Goodrich
Consulting Engineer
Transportation and Traffic

March 1976

TRANSPORTATION GUIDELINES

I. A - The proposed parking structure occupies (with the exception of the historic Audiffred Building) the northern half of a block bounded on the north by Mission Street, on the east by The Embarcadero, on the south by Howard Street, and on the west by Steuart Street. (See map 1 from De Leuw, Cather & Caompany report.)

I. B - Project access to existing streets is on The Embarcadero and Steuart Street only. On The Embarcadero only one lane of ingress to the parking structure is provided. No egress from the structure to The Embarcadero is considered. On Steuart Street, three lanes of access are provided. It is proposed that the center lane be reversible so that in the morning there would be two lanes of ingress to and one lane of egress from the parking structure. In the afternoon this would be reversed. During mid-day and other slack hours the center lane would be closed completely.

There is no provision in the plan for direct access to transit, bike and pedestrian ways other than the manner in which these other modes of travel utilize adjacent streets and sidewalks.

I. C - There is no plan for a truck loading area to service the approximately 18,000 square feet of commercial space planned for the first floor. It is assumed this will have a mixture of retail and service uses.* Given this type and amount of commercial space, no curb cut for truck loading should be required, however, the Planning Code requires one off-street loading space. Trucks should be able to park parallel for loading and unloading. However, to minimize the conflict between trucks, curb-parked vehicles and traffic leaving the parking structure northbound on Steuart, approximately 210 feet would need to be yellow curbed north of the garage access on Steuart Street. To prevent similar conflicts on The Embarcadero about 230 feet of yellow curbing would be necessary. This would be accomplished, when detailed designs for the facility are more advanced, by sending a letter to the Director of the Department of Public Works requesting the designation. In that letter, a full description of the location would be included. The Department of Public Works would study the designation request including referral to the San Francisco Police Department if relevant. The Department of Public Works would make a recommendation and a hearing would be held.

Given this amount of yellow curbing and parallel truck parking, no special amount of area for truck manuvering would be required.

I. D - Pedestrian access to the interior of the parking structure is at its four corners. The sidewalk runs the full length of the structure on both sides to the commercial space on the first floor and to adjacent buildings. No sidewalk width changes are proposed nor do any appear

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* "Embarcadero-Mission Parking Structure" by De Leuw, Cather & Company, March, 1975.

needed on the basis of short-period pedestrian counts as follows:

Steuart Street	-- 4:50 - 5:00 p.m. -- 29 pedestrians
The Embarcadero	-- 5:00 - 5:10 p.m. -- 17 pedestrians

Neither white nor green curb would be required since this requirement would be satisfied by the yellow curbing described above.

I. E - The parking structure as proposed would have no effect on street right-of-way characteristics. However, if the proposed redesigned Embarcadero roadway is carried out, street rights-of-way would be altered.and local traffic affected accordingly. (See map 12 from De Leuw, Cather report.) Howard Street would be closed to left turns from The Embarcadero where they are currently permitted. Steuart Street would, in all probability, be closed between Howard Street and Folsom Street.

I. F - The plan of the parking facilities is shown on the enclosed floor plan (map 13 from De Leuw, Cather & Company report). Access to and from the structure is on the south end of the building. The curb cut for ingress only on The Embarcadero is approximately 13 to 15 feet, depending on the amount of driveway flare provided to permit an easier turning movement. The curb cut for both ingress and egress on Steuart Street is approximately 38-40 feet, again depending on the amount of driveway flare provided.

The proposed lay-out for parking spaces on each floor above the second is also shown on this floor plan. A total of 475 parking spaces would be provided over five parking floors. No mention is made of the number of spaces for compact cars. However, relining some of the parking areas, particularly those in the middle, could provide at least 140 compact car spaces. At the same time, this would increase the total number of spaces to 495-500.

Because of the need for yellow curbing on both The Embarcadero and Steuart Street, the proposed garage would eliminate 23 curb spaces. Most of these (16) would be on Steuart Street where present parking is perpendicular to the curb. In addition it would displace a small surfaceparking lot having 37 parking spaces. Thus, the net increase in parking provided by the garage would be from 415 to 443 spaces, depending on the number of compact car spaces provided.

Method of operation of the parking garage is to have automated ingress whereby when the parker takes a ticket from a ticket spitter, a gate raises to let him in. Egress would be by manned stalls where, after the parking fee is registered, a gate lifts to permit exit.

I. G - There is no plan for bicycle parking facilities as part of this garage.

II. A - Transit service to the study area by Muni is primarily concentrated on Market and Mission Streets, having six and five lines, respectively. Three other Muni lines loop through the fringe of the study area on Drumm, Main and Beale Streets. One Muni route also operates on The Embarcadero between Fisherman's Wharf and the Southern Pacific station.*

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* From Muni route map

Additional transit service is provided by BART, through The Embarcadero station; by Golden Gate Transit which has a peak-hour only stop at Main and Folsom, and by the Sausalito, Tiburon and Larkspur Ferries.

II. B - Market and Mission Streets are the only two transit preferential streets located within the study area.

Major thoroughfares serving the study area include The Embarcadero, Market, Steuart, Beale and Main Streets. There are no secondary thoroughfares nor recreational streets within the area. Spear Street is proposed to be improved as a bicycle route.*

The number of traffic lanes, direction of flow, and width of sidewalk in the surrounding area are shown on Map A.

II. C - Present parking within the study area consists of 638 curb spaces and 3,634 off-street parking spaces.**

The number of on-street parking meters and their time limits are shown by block face on Map B. The number of restricted spaces by block face is shown on Map A by curb color designation.

III. EXISTING TRAFFIC CONDITIONS

Estimated transit ridership generation*** and traffic counts on streets near the parking garage which were obtained from the San Francisco Department of Traffic Engineering are as follows: Counts were taken on The Embarcadero, Tuesday, January 27, 1976; on Mission Street, Wednesday, April 17, 1974; and on Howard Street, Wednesday, April 17, 1974.

A. Transit Trips Generated by Project

24-Hr	7-9 AM Peak	4-6 PM Peak	10am-3pm Mid-Day
20	3	3	10

B. Existing Auto Traffic Counts

	24-Hr	7-9 am	4-6 pm	10 am-3 pm	(Night) 7 pm-6 am
Howard Street	7,700	1,400	1,400	3,100	1,100
The Embarcadero	15,100	3,200	2,700	6,200	2,300
Mission Street	13,900	1,900	2,000	5,800	2,200

= No counts available on Steuart Street

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* Transportation Element of San Francisco Master Plan

** "Embarcadero-Mission Parking Structure" by De Leuw, Cather & Company, March 1975.

*** Transit trips are estimated at one per 1,000 square feet of commercial floor area.

The intersection volumes as a percentage of capacity are as follows:

Percent Intersection Capacity At Service Level "D"*****
(PM Peak--4:30 - 5:30)

Mission Street & Steuart Street	34%
Projected to 1985	46%

Auto Trips Generated by the Project are Estimated as Follows:*

	24-Hr	7-9 am	4-6 pm	10-3 Mid-day	Night
Auto Trips	1,190	220	240	470	180**

Existing buildings on the site include a resaturant and transient hotel rooms. The demolition of these buildings will remove some trips. It is estimated that these trips removed would equal 50 percent of the transit and a small portion of the auto trip generation of the project.

The effects of special events, such as those expected for the Yerba Buena Sports Center, on these traffic counts and intersection capacities can only be estimated. It is estimated that, under the worst conditions, no more than 300 cars*** would be added to each of the three streets--Mission, Market and Howard, during the event peak hour. Since the peak volumes would occur predominantly during the night off-peak period they would not affect the capacity of these streets or their intersections. The percentage of capacity used in all cases would still be less than in the evening peak hour.

The amount of trips generated by the garage for these events would also be minimal because of the availability of substantial amounts of parking space much closer to the Yerba Buena project, which is approximately three-fourths of a mile from the proposed garage.

Service vehicle, bicycle and pedestrian volumes for the proposed project are estimated to be as follows:****

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* Source: "Embarcadero-Mission Parking Structure" by De Leuw, Cather & Company, March 1975 and "San Francisco Downtown Parking and Traffic Study (DPATS)" 1966.

** Night trips are estimated assuming the garage stays open until midnight during events at Yerba Buena Center.

*** The estimate by D. K. Goodrich is a judgement of the maximum number of autos during peak hour for an event at the Yerba Buena Center.

**** Estimates by D. K. Goodrich. Total trips exceed the sum of the various periods because certain hours are missing. Assumes 18,000 square feet of commercial space.

***** Service Level D is defined in footnote 4 on page 14 in the body of the report.

C. Service Vehicle Counts

24-Hr	7-9 AM Peak	4-6 PM Peak	10-3 Mid-day	Night
30	6	4	18	0

D. Bicycle Trips*

24-Hr	7-9 AM Peak	4-6 PM Peak	10-3 Mid-day	Night
0	0	0	0	0

E. Pedestrian Counts

24-Hr	7-9 AM Peak	4-6 PM Peak	10-3 Mid-day	Night
1,550	290	310	610	260

The incremental load of other new facilities within the area would arise predominantly from the four buildings at One Market Plaza, the Howard/Main Building, the 221 Spear Building, and the 120 Howard Building which have a combined total of approximately two million square feet. This would increase traffic as follows:

Incremental Load on New Facilities**

24-Hr	7-9 AM Peak	4-6 PM Peak	10-3 Mid-day	Night
2,710	515	530	1,100	430

The incremental load of these new facilities by 1985 would increase the utilized capacity of the intersections along Mission and Market Streets to over 50% with a maximum utilization at Mission and Beale of 59%***.

IV. ENVIRONMENTAL IMPACTS

The impact on transit ridership would be small. The project itself would generate about twenty transit trips per day for the commercial area.

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* No bicycle parking is planned as a part of this project.

** Source: "Embarcadero-Mission Parking Structure" by DeLeuw, Cather & Company, March, 1975.

*** Counts made by the City Department of Public Works, Bureau of Traffic Engineering on Mission Street and a manual quick count on Beale Street made by D. K. Goodrich. Intersection capacity calculations are based on standard traffic engineering methods reported in Traffic Engineering, January, 1971.

The availability of increased parking, on the other hand, would tend to divert some transit riders to driving their cars.

The long-range impact on transit ridership depends primarily on the amount of additional parking provided both within the study area and in areas adjacent to it. With the anticipated growth of 11,000 jobs in northeastern San Francisco (Department of City Planning and Public Works, 1975) by the year 2000, this garage alone would have little impact on transit patronage. However, the overall growth in parking facilities provided (both in garages such as this and as a part of new office buildings) could have a detrimental impact. Given the policy* that new office buildings may devote no more than 7 percent of their total floor space to parking, a net increase in transit patronage is to be expected.

The garage would conflict with the operation of existing or improved transit insofar as the added traffic might increase street congestion. Traffic counts obtained from the City Bureau of Traffic Engineering indicate that the intersections within the immediate vicinity of the garage are operating at 30 to 40 percent of capacity. Traffic analyses of projections to the year 1985 indicate these intersections would then be operating at 40 to 50 percent of capacity.** The addition of the parking garage would increase these figures by another 3 percent*** during the evening peak hour under the present street configuration. If the Embarcadero roadway is depressed, forcing the closure of Howard and Steuart Streets where they meet the roadway, this would cause some rerouting of traffic. With or without Embarcadero reconstruction, the critical intersection, insofar as the garage is concerned, would be Mission and Steuart Streets. It is presently operating at 34 percent of capacity with a 1985 projection of 46 percent of capacity. The garage would increase these figures by 5 percent.**** This intersection should be able to handle about twice its present volume.

The impact due to street blockage from loading (either truck or pedestrian) is also negligible. Perpendicular parking is presently permitted on both sides of Steuart Street. Both present and projected traffic volumes for Steuart Street are sufficiently low that the occasional additional truck traffic serving the garage would not affect street capacity. Here it is assumed that, for ease of flow and minimization of conflict from the garage onto Steuart Street, that curb parking from the garage access to Mission Street would be prohibited by use of a yellow curb which would alleviate any possible problems.

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* Source: "Parking In San Francisco: Policies and Programs for Parking Management", Departments of City Planning and Public Works, December, 1975.

** Source: "San Francisco Downtown Traffic", Department of Public Works, 1970.

*** Intersection capacity calculations are based on standard traffic engineering methods reported in Traffic Engineering, January, 1971.

**** Based on rerouting traffic due to closure of Howard and Steuart Streets if redesign of the Embarcadero is implemented.

Eliminating these curb parking spaces effectively changes the right-of-way of both Steuart Street and The Embarcadero and thus provides more traffic capacity.

In its 1965 publication, "Downtown Parking", the Planning Commission projected an expected 1975 surplus of parking in the direct vicinity of the proposed garage of approximately 750 spaces. This expected surplus has not occurred due to the large amount of commercial development in the study area. A field survey showed between 92-95% of the off-street (193 vacant at 10 a.m. and 313 vacant at 3 p.m.) parking spaces are occupied during the day. * Considering that many of the unoccupied spaces are also reserved, the effective occupancy rate would be closer to 100%. In addition, current evidence shows a deficiency of about 170* parking spaces as evidenced by the amount of illegal parking in the area. Further developments such as One Market Plaza, Embarcadero Number 3, the Federal Reserve Bank Headquarters, and others could create added demand for parking.

The impacts on both bicycle and pedestrian accessibility are small. The proposed garage does not displace any pedestrian walkway or bicycle paths. The prevailing sidewalk widths on both The Embarcadero and Steuart Streets are sufficient to handle the added pedestrian traffic generated by the garage. Present street widths and traffic volumes are such that bicycle traffic would not be hazarded more than at present. Further, the proposed improvement of Spear Street, one block west of Steuart, to a bicycle route would mitigate against such impacts.

The vehicle miles of travel (VMT) within the study area, generated by the project, would be: 1,190 trips x 0.4 miles per trip = 476 VMT. The total within and without the study area (over states impact due to diversion from other destinations) would be: 1,190 trips x 9.5 miles per trip = 11,300 VMT. The percent of heavy trucks for the project is estimated to be 2.5%.

The number of cars idling in line at the garage is greatest during the evening peak hours. In the two-hour peak period from 4-6 p.m., 240 vehicles would enter or leave the garage; an even higher concentration of 135 vehicles occurs during the one-hour period from 4:15 to 5:15 p.m. Of these 135 cars, 100 would be outbound serviced by two gates, while the remaining 35 would be inbound serviced by one gate. Outbound traffic is where the greater congestion will occur.

To determine the number of cars idling, the Poisson Distribution is used which shows the probability of one or more cars arriving in any specified time interval (say, one minute) given an average arrival rate. In this case, the average arrival rate is .6 minutes. Assuming an average service time for a car to exit of 45 seconds (.75 minutes), the distribution

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* Source: "Embarcadero-Mission Parking Structure" by DeLeuw, Cather & Company, March, 1975.

** Poisson and Other Distributions in Traffic, Eno Foundation for Transportation, 1971.

of the number of cars in the queue over the peak hour can be estimated. The range of this distribution is from 0 to 5 cars while the average is 1.4 cars idling during the peak hour.

Implementation of the redesigned Embarcadero roadway would have no impact on the average queue length or number of cars idling during peak hours because the diversion of cars entering from The Embarcadero to Steuart Street would principally affect the morning peak hour; the evening peak hour is when the principal problem of queuing occurs.

V. MITIGATION MEASURES

Implementation of the redesigned Embarcadero roadway would increase traffic on The Embarcadero and necessitate the rerouting or diversion of some existing traffic. Because of this, it has been recommended* that The Embarcadero ingress to the garage be closed when the project is completed. This recommendation should be modified to permit access for emergency vehicles only, such as fire trucks or ambulances.

Traffic diversion and rerouting caused by the redesigned Embarcadero roadway could increase the traffic volume on Steuart Street by as much as 1,000 vehicles during the 4 to 6 p.m. peak period. This could be handled by prohibiting peak hour parking in front of the YMCA on Steuart Street as well as in front of the garage itself. This would displace an additional 20 perpendicular parking spaces during the peak hours. Conversion of these parking spaces to parallel parking during the off-peak periods would result in a loss of 13 additional parking spaces in addition to that described earlier in this report.

A mitigation measure already suggested is yellow curbing on both The Embarcadero and Steuart Street north of the access to the garage on these two streets. This would be accomplished by contacting Public Works and requesting the designation. In that contact a full description of the location would be provided. The Department of Public Works would study the designation request including referral to the San Francisco Police Department if relevant. The DPW would make a recommendation and a hearing would be held.

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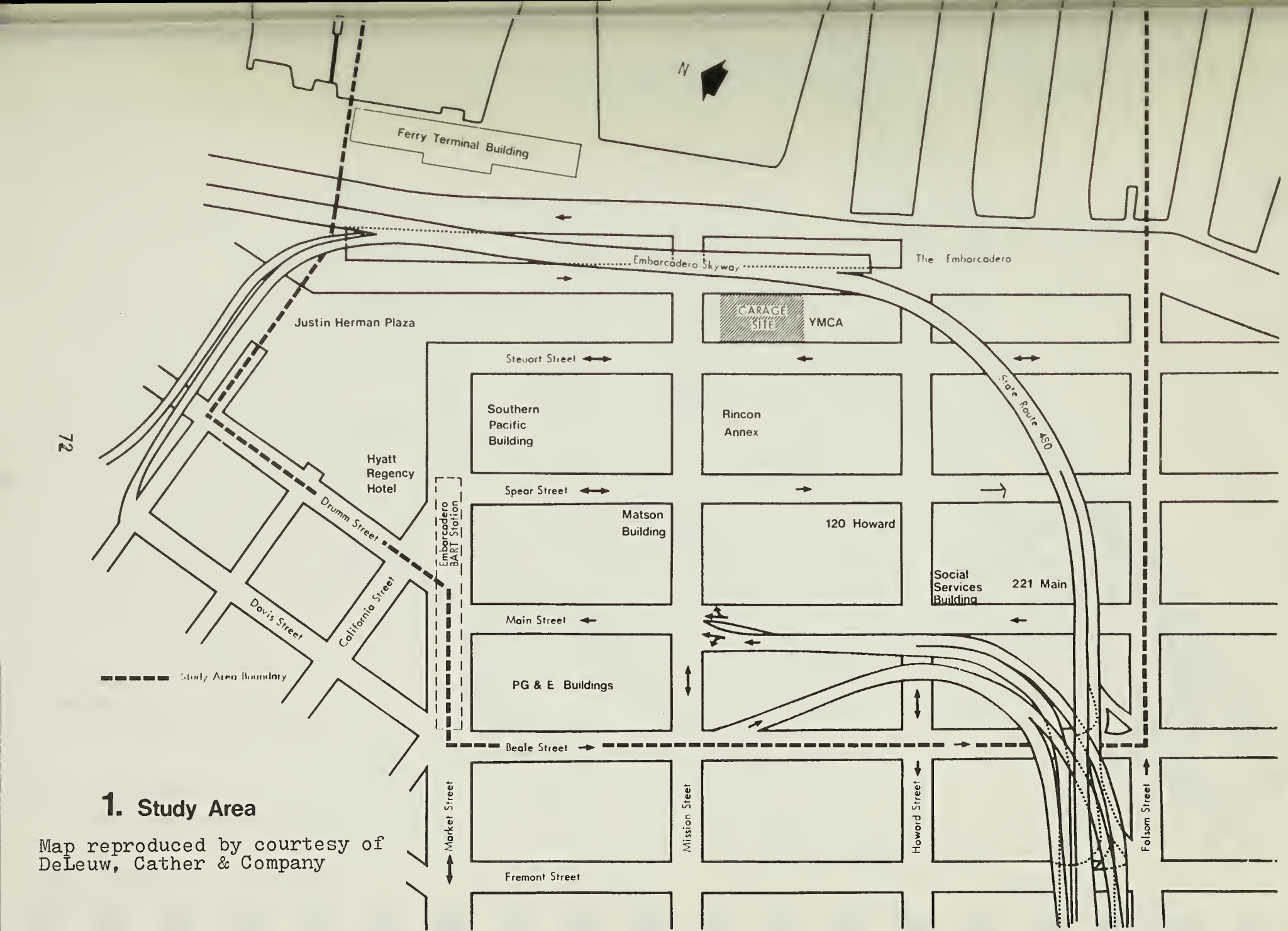
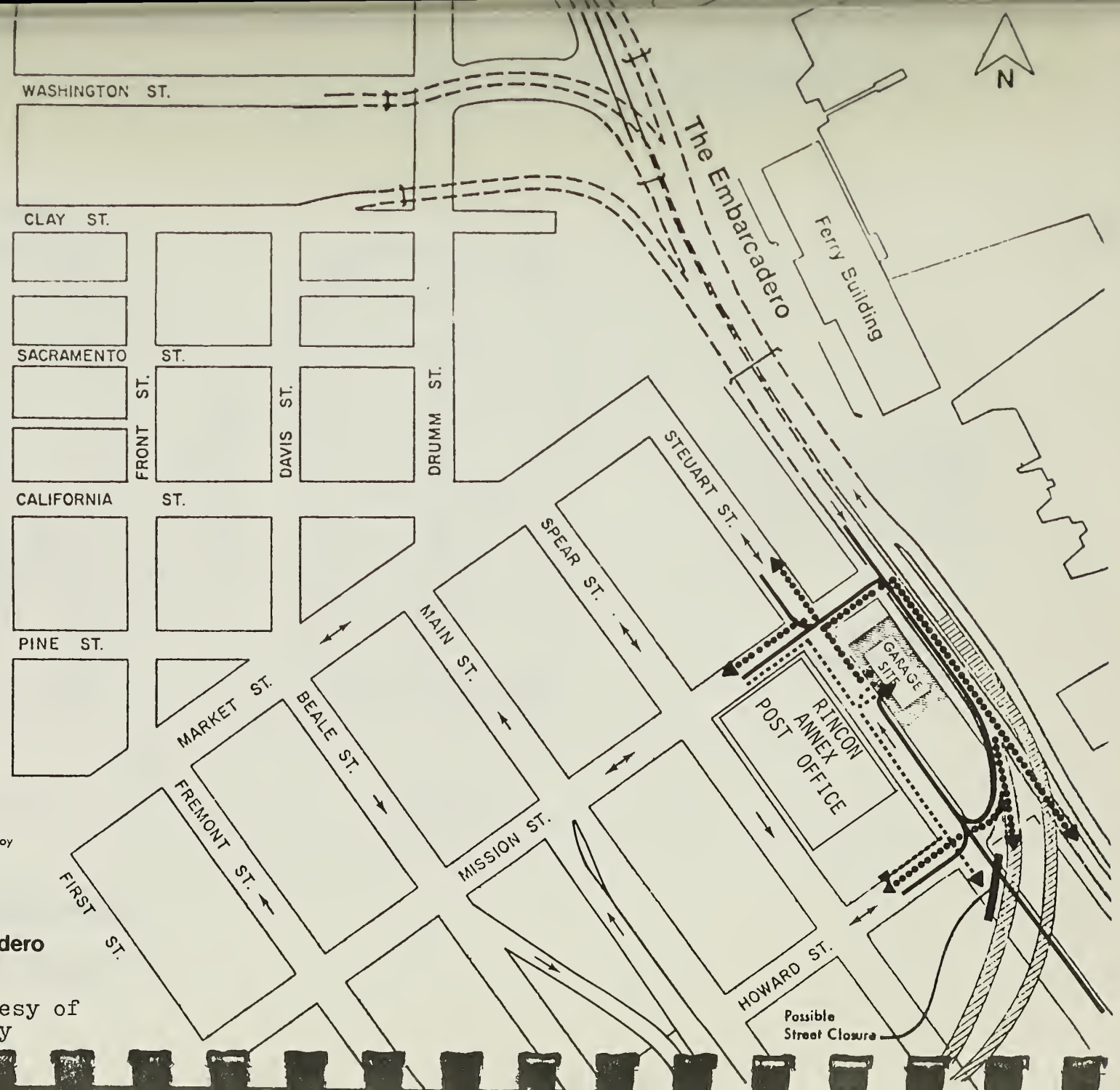
* Source: "Embarcadero-Mission Parking Structure" by DeLeuw, Cather & Company, March, 1975.



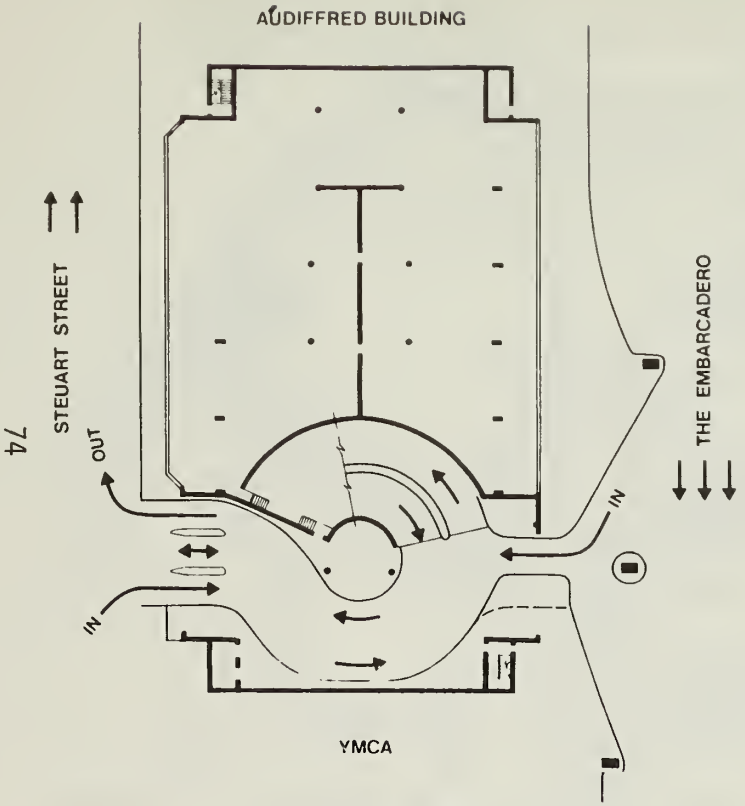
1. Study Area

Map reproduced by courtesy of DeLeuw, Cather & Company



12. Site Access with Proposed Embarcadero Roadway Plan

Map reproduced by courtesy of DeLeuw, Cather & Company



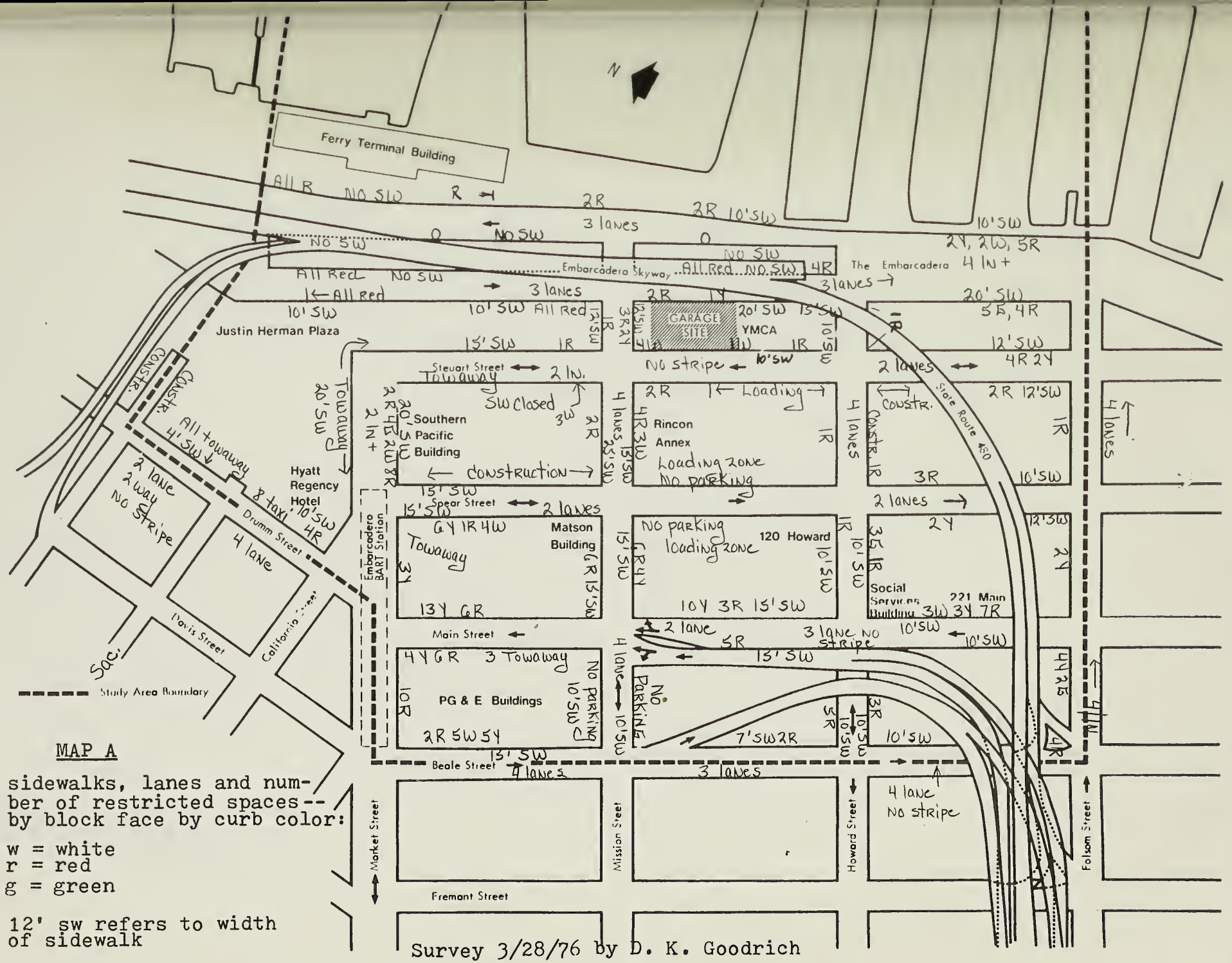
Ground Floor

Typical Floor

Cross Section
(At Center of Garage)

13. Preliminary Garage Design

Map reproduced by courtesy of
DeLeuw, Cather & Company



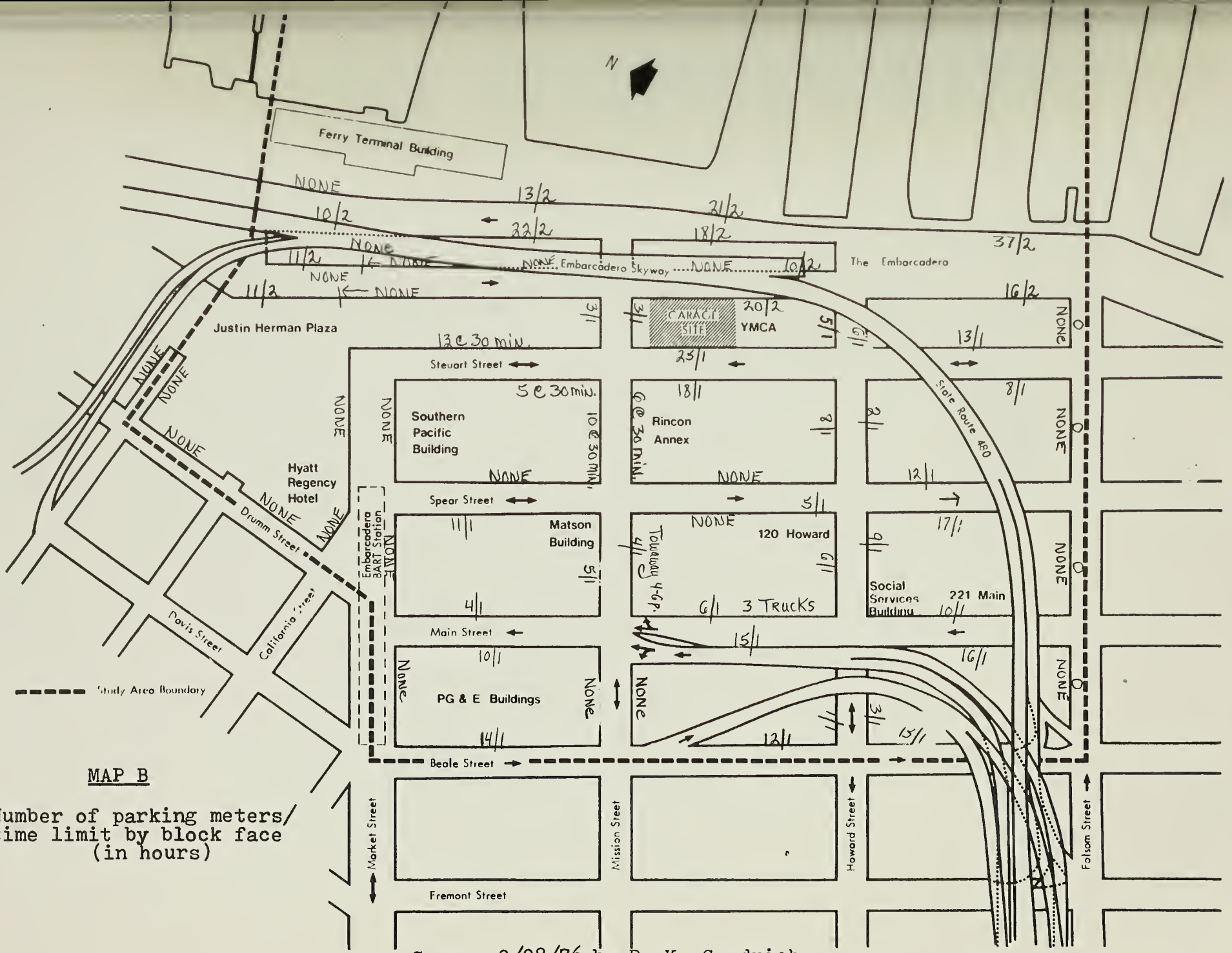
MAP A

sidewalks, lanes and number of restricted spaces-- by block face by curb color:

w = white
r = red
g = green

12' sw refers to width of sidewalk

Survey 3/28/76 by D. K. Goodrich



MAP B

Number of parking meters/ time limit by block face (in hours)

Survey 3/28/76 by D. K. Goodrich

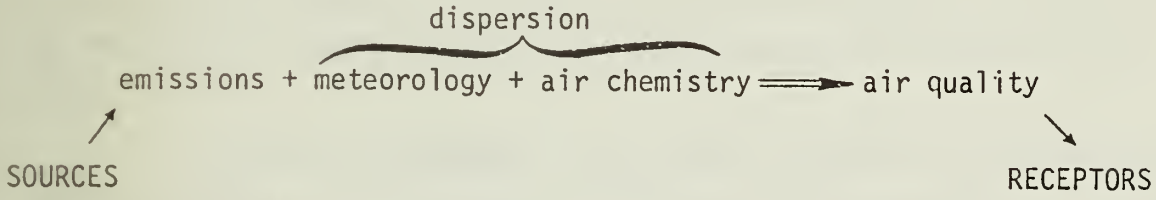
APPENDIX B

AIR QUALITY REPORT

1.0 Air Resources - Existing Air Quality

1.1 Introduction

Air quality is determined by the amount and type of pollutants emitted and by the subsequent dispersion of the pollutants. Schematically, air quality may be described as follows:



Pollutants. Air pollutants are divided into two categories, primary and secondary. Primary pollutants are those emitted directly from a source and include carbon monoxide (CO), nitrogen oxide and nitrogen dioxide (NO and NO_2), sulfur dioxide (SO_2), particulates, and various hydrocarbons (HC). Air quality degradation resulting from primary pollutant emission is generally concentrated local to a source before the primary pollutants have time to disperse and undergo chemical change. As a result, local air quality will be generally determined by the emission and dispersion of pollutants emitted local to a receptor site.

Secondary pollutants are those formed by chemical reactions of some primary pollutants in the atmosphere. Secondary pollutants are generally dubbed "oxidants" and include ozone (O_3), photochemical aerosols, PAN (peroxyacylnitrates), and nitrogen dioxide (NO_2). Air pollution degradation resulting from the slowly forming secondary pollutants are experienced over an area downwind of the primary pollutant sources. As a result, regional air quality will be generally determined by regional emission of primary pollutants upwind of the receptor site and their subsequent participation in atmospheric reactions in transport to the receptor site.

Regional air quality is adequately described by data collected at agency-operated air monitoring stations. However, data gathered at air monitoring stations cannot be generally used to describe local air quality. Primary pollutants disperse rapidly in the atmosphere and the locally high concentrations are not reflected in monitoring station data. Air quality with respect to primary pollutants, therefore, is described by mathematically modelling the pollutant sources local to the project site.

Air Quality Standards. The levels at which air pollution produces adverse effects on the receptor are reflected in the ambient air quality standards presented in Table 1. These standards are set to protect that element of the population (approximately 15 to 20 percent) which is especially susceptible to respiratory responses to pollutants.

The criteria upon which the Federal standards were developed are available in a series of documents published by National Air Pollution Control Association and the Environmental Protection Agency.* The ambient air quality standards are not absolute, and undoubtedly they will change as more information becomes available. (The current uncertainty in assigning air quality standards is reflected in the differences between the California and Federal standards.) Health-related effects data come from animal, epidemiological and, to a limited extent, human exposure studies. Research is being currently pursued to: (1) define more clearly the pollution levels at which adverse effects are observed, (2) develop the correlation between animal and human responses, (3) obtain more epidemiological information, and (4) generally bridge the information gaps and reduce the gaps and reduce the uncertainty associated with current standards. Future

---

* NAPCA, Air Quality Criteria for Sulfur Oxides, AP-50, 1969; ... for Particulate Matter, AP-49, 1969; ... for Photochemical Oxidant, AP-63, 1970; ... for Hydrocarbons, AP-62, 1970; ... for Carbon Monoxide, AP-62, 1970.
EPA, Air Quality Criteria for Nitrogen Dioxide, AP-68, 1971.

TABLE 1

AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards		National Standards[1]		
		Concentration[2]	Method[3]	Primary[2, 4]	Secondary[2, 5]	Method[6]
Photochemical Oxidants (Corrected for NO_2)	1 hour	0.10 ppm (200 ug/m^3)	Neutral Buffered Potassium Iodide	160 ug/m^3[7] (0.08 ppm)	Same as Primary Std.	Chemiluminescent Method
Carbon Monoxide	12 hour	10 ppm (11 mg/m^3)	Non-Dispersive Infrared Spectroscopy	–	Same as Primary Standards	Non-Dispersive Infrared Spectroscopy
	8 hour	–		10 mg/m^3 (9 ppm)		
	1 hour	40 ppm (46 mg/m^3)		40 mg/m^3 (35 ppm)		
Nitrogen Dioxide	Annual Average	–	Saltzman Method	100 ug/m^3 (0.05 ppm)	Same as Primary Standards	Proposed: Modified J-H Saltzman (O_3 corr.) Chemiluminescent
	1 hour	0.25 ppm (470 ug/m^3)		–		
Sulfur Dioxide	Annual Average	–	Conductimetric Method	80 ug/m^3 (0.03 ppm)	–	Pararosaniline Method
	24 hour	0.10 ppm (260 ug/m^3)		365 ug/m^3 (0.14 ppm)	–	
	3 hour	–		–	1300 ug/m^3 (0.5 ppm)	
	1 hour	0.5 ppm (1310 ug/m^3)		–	–	
Suspended Particulate Matter	Annual Geometric Mean	60 ug/m^3	High Volume Sampling	75 ug/m^3	60 ug/m^3	High Volume Sampling
	24 hour	100 ug/m^3		260 ug/m^3	150 ug/m^3	
Lead	30 Day Average	1.5 ug/m^3	High Volume Sampling, Dithizone Method	–	–	–
Hydrogen Sulfide	1 hour	0.03 ppm (42 ug/m^3)	Cadmium Hydroxide Stractan Method	–	–	–
Hydrocarbons (Corrected for Methane)	3 hour (6-9 a.m.)	–	–	160 ug/m^3 (0.24 ppm)	Same as Primary Standards	Flame Ionization Detection Using Gas Chromatography
Ethylene	8 hour	0.1 ppm	–	–	–	–
	1 hour	0.5 ppm				
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%	[8]	–	–	–

NOTES.

1. National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.
2. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
3. Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency (EPA).
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after implementation plan is approved by the EPA.
6. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
7. Corrected for SO_2 in addition to NO_2.
8. Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

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research will also attept to assess the synergistic effects of pollutants and the health-related effects of pollutants yet to be identified or characterized (most notably, photochemical aerosol).

1.2 Existing Regional Air Quality

Existing regional air quality for the project area is described by data from the San Francisco Air Monitoring Station operated by the Bay Area Air Pollution Control District and located at 939 Ellis Street. These data were compiled in 1974 for the entire year and represent the latest data available from the California Air Research Board. Table 2 describes the number of days the Federal air quality standards were exceeded for the three most important gaseous pollutants, oxidant, nitrogen dioxide, and carbon monoxide. Ambient air quality standards applicable in the State of California were presented in Table 1 for comparison.

Secondary pollutants, oxidants specifically, represent the major regional air quality problem in the San Francisco Bay Air Basin. The formation of oxidant, a complex process not yet completely understood, occurs in the presence of sunlight, and includes hydrocarbons, and oxides of nitrogen as reactants, with time being a critical factor.

Current air quality data indicates that the San Francisco Bay area is already subject to degraded air due to oxidant. In order to assess the impact of this oxidant, the source must be established.

A study by the California Air Resources Board reports number of days in which exposures to oxidant exceeded .10 parts per million, as a function of location. The isopleths are shown in Figure 1. From Figure 1 it is clear that oxidant is formed from pollutants generated near the coast as the prevailing winds off the ocean carry these "oxidant precursors" inland. The result is lower oxidant concentrations in the San Francisco area and higher oxidant concentrations in the Livermore area.

TABLE 2

NUMBER OF DAYS ON WHICH CERTAIN POLLUTANTS EXCEEDED CALIFORNIA OR FEDERAL AIR QUALITY STANDARDS

As Measured at San Francisco (Ellis Street) Air Monitoring Station, 1974

Month	Number of Days Standard Exceeded		
	Oxidant* (0.08ppm/hour)	NO_2** (0.25ppm/hour)	CO (9ppm/8 hours)
January	0	0	2
February	0	0	0
March	0	0	0
April	0	0	0
May	0	0	0
June	0	0	0
July	0	0	0
August	0	0	0
September	0	0	0
October	4	0	0
November	0	0	0
December	0	0	0
TOTAL	4	0	2

* Federal Primary Standards

** California Standard

SOURCE: California Air Quality Data, California Air Resources Board, Volume VI, Number 4, December 1974.

1.3 Existing Local Air Quality

The main source of primary pollutants is the automobile. As a result, roadways usually represent the major source of emissions local to a project. Air quality monitoring data cannot be used to describe air quality local to the project. Local emissions of primary pollutants are substantially dispersed within a few thousand feet of the project site. Local air quality is most effectively determined, in the opinion of the consultant, by modelling mathematically the pollutant sources (for example, automobile traffic) local to the project site. This is especially true in the downtown area of San Francisco where hilly terrain, large buildings and rough topography, in general, result in non-uniform dispersion patterns.

In order to assess the effect of emissions from local roadways on the study area, the roadways are modeled using the Gaussian plume technique with a constant emission rate.

"Gaussian Plume Modelling" is a commonly applied technique used in air resources engineering to describe the dispersion of pollutants downwind from point sources, e.g., industrial stacks, and line sources, e.g., roadways. The model is based on the solution to the (convestive-diffusion) equations governing dispersion. So-called Gaussian coefficients are incorporated into the basic solution (limited otherwise to laminar flow) to account statistically for the influence of atmospheric turbulence in determining the mixing behavior.* This methodology provides for estimating dispersion in turbulent atmospheric flow which is in reality what occurs. Without using Gaussian coefficients the solution would be limited to much simpler laminar flow which rarely occurs.

---

* The Gaussian plume modelling technique is described in air resource engineering textbooks, e.g., Stern, et. al., Fundamentals of Air Pollution Academic Press, 1974, and documented in Workbook of Atmospheric Dispersion Estimates by D. Bruce Turner of the U.S. Department of Health, Education and Welfare (PHS 999-AP-28, 1970).

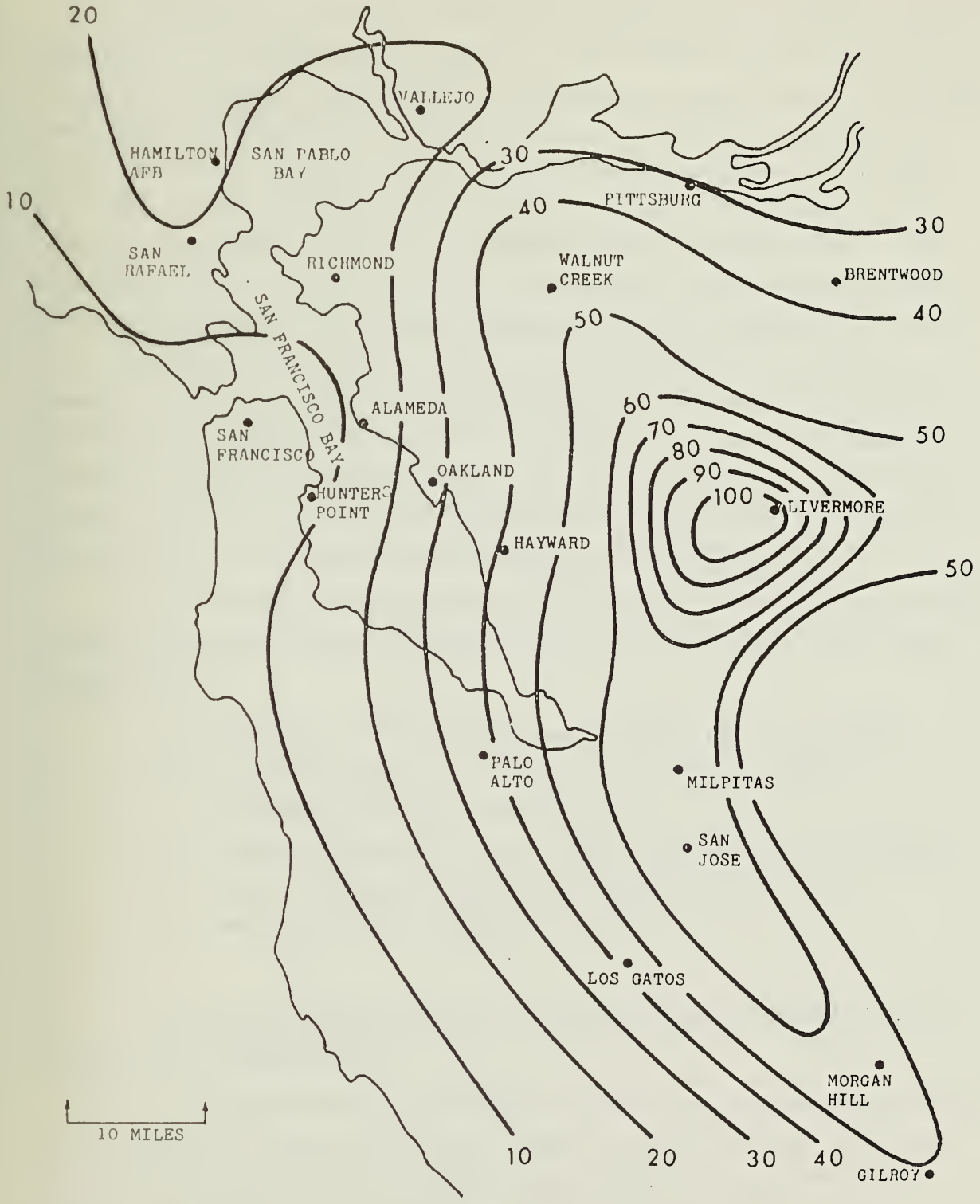


FIGURE 1

DISTRIBUTION OR DAYS PER YEAR WHEN OXIDANT CONCENTRATIONS EQUALED OR EXCEEDED .10 PPM DURING 1969-1970

SOURCE: The Distributions of Carbon Monoxide and Oxidant Concentrations in Urban Areas; California Air Resources Board, October 1973.

An important word of caution is warranted here. Gaussian Plume Modelling is a relatively new science. Current models are very difficult to apply to downtown areas where tall buildings, street canyons, and rough topography make dispersion analysis especially difficult. Detailed flow field models are available but are very difficult to use and are beyond the scope of work intended here. Therefore, Gaussian Plume modelling techniques have been used here to represent worst case conditions. The modelling effort is most suited for exposures near the source and become less reliable far from the source because of complex dispersion characteristics. It should be noted that rough surface characteristics will, in general, result in lower pollutant concentrations because of increased mixing due to increased turbulence. An exception to this is the case where buildings or topography create areas of "stagnant air" and little mixing occurs. It is felt that the pollutant levels presented here are conservative, i.e., higher than those which would actually occur.

The Gaussian Plume technique was applied to the project site using traffic data from the peak afternoon hour for the following "worst case" conditions:

- Peak hour traffic volume as shown in Table 3, page 85.
- Wind off the Bay at a velocity of 2.5 mph. Angle of incidence with the freeway is 20°.
- Freeway elevated 20 and 35 feet (2 decks) above the ground.
- Stable atmospheric condition (Stability Class F).
- Average vehicular speed of 10 mph.

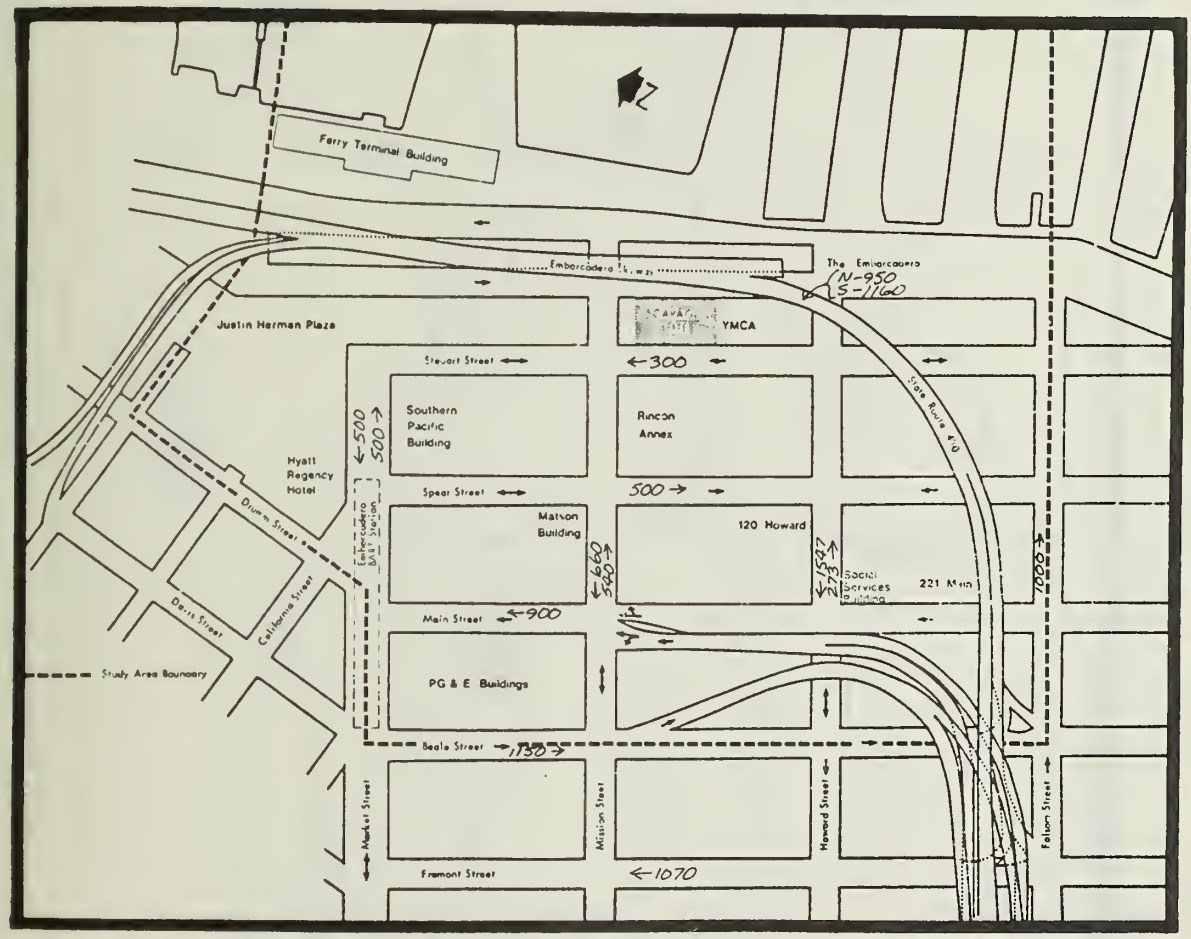
The results obtained using the gaussian model are plotted in Figure 2 for carbon monoxide.

A 10 percent mix of heavy-duty vehicles was assumed, and deterioration of control devices and effect of speed on emissions were considered. The pollution contribution from each roadway was calculated and then summed to produce the profiles shown in Figure 2.

TABLE 3

EXISTING TRAFFIC VOLUMES USED FOR

POLLUTANT MODELING



Source: D. K. Goodrich, Telephone Conversation of March 31, 1976.

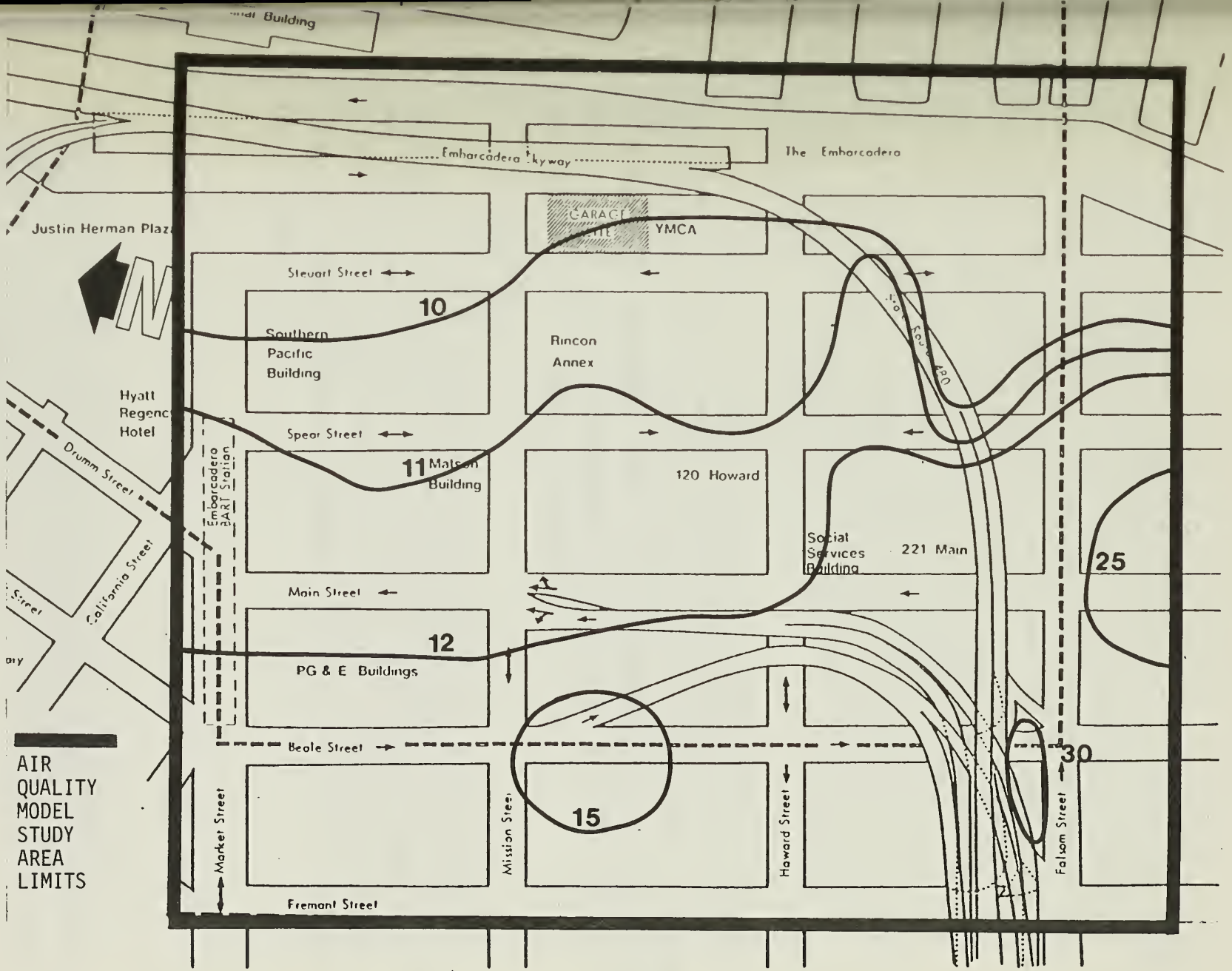


FIGURE 2 CARBON MONOXIDE ISOPLETHS FOR EXISTING WORST-CASE PEAK HOUR CONDITIONS (PARTS PER MILLION)

Figure 2 does not include any allowance for background pollutant concentration. However, as stated earlier, primary pollutants (especially CO), tend to be a problem local to a source and are dispersed rapidly. This is most pronounced on a winter morning when inversions are low and winds are light. During such times, background concentrations of primary pollutants in the project area are expected to be quite low due to overnight dispersion. In light of this, concentrations shown in Figure 2 likely are close to levels that would be experienced at the site under worst-case conditions. However, these worst case conditions would rarely occur. San Francisco is known for being windy and this would greatly reduce pollutant concentrations. Every doubling of wind speed reduces concentrations by a factor of 2.

Profiles are presented in Figure 3 for total oxides of nitrogen (NO_x). An air quality standard currently exists for NO_2. None has yet been written for NO or NO_x. The automobile emits primarily NO. Significant oxidation in the atmosphere of NO to NO_2 takes time on the order of one hour. Thus, it is unlikely that pollutants passing over the site will contain a significant amount of locally produced NO_2.*

Conclusion

The Bay Area experiences poor air quality in the inland areas downwind of the coastal area. The coastal area and downtown San Francisco area experiences relatively clean air due to prevailing winds which come directly off the ocean and are free of pollutants. Prevailing winds are strong and regular, resulting in increased dispersion of primary pollutants in the downtown area.

---

* The difficulty in assessing locally produced NO_2 is compounded by insufficient data regarding the effect of vehicle speed in NO_x emission. Recognition of this difficulty is illustrated by EPA's promulgated "Indirect Source Plan" (Federal Register, 25 February 1974, 39 FR 7270) wherein local assessment is limited to CO.

2.0 AIR RESOURCES - AIR QUALITY IMPACT

2.1 Introduction

The impact of the Embarcadero Mission Parking Structure upon air quality is determined by evaluating:

1. The sources of air pollutant emissions.
2. The amount and type of pollutants emitted.
3. The dispersion of the pollutants locally.
4. The dispersion of the pollutants regionally.

2.2 Sources of Air Pollutant Emissions

Preparation of the site for building construction produces two sources of air pollutant emissions: exhaust emissions from construction equipment and dust generated as the result of soil movement. The emissions produced during fill and grading are of short-term duration and are, therefore, not considered in detail. Construction of the proposed parking structure will produce dust particulate emissions and subsequent distribution of dust that may be troublesome to people on nearby streets and to construction workmen if prescribed wetting procedures are not followed.

Long-term impacts are those associated with permanent usage of the proposed development, and consist of air pollutant emissions from the following sources:

Stationary	Mobile
Space heating and cooling	Motor vehicles
Water heating	
Cooking	
Electrical usage increase	

When emissions from these sources are produced in sufficient quantity, degraded air quality may result. As a first step in assessing the impact of these pollutant sources on air quality, detailed emissions inventories are required.

2.3 Emissions Inventories

Emission inventories are presented in Tables 4, 5 and 6 for the sources associated with the completed project. The increase in electrical energy demand, would not produce pollutant emissions at the site of the proposed development but rather at steam electric generating plants located throughout the electrical generating network. Tables 4 and 5 quantify the increase in emissions throughout the electrical generating network due to the proposed project. The emissions data shown in Tables 4 and 5 on pages 90 & 91 are presented for the case of natural gas or fuel oil combustion at the local powerplants. Natural gas shortages may require fuel oil combustion.

Table 6 summarizes the estimated increase in mobile source emissions that would be generated as a result of the proposed project. This estimate is based on projected traffic associated with the project, and assumes that the development would be completed by 1977. If the development is completed after 1977, emissions should be lower as a result of Federal and State exhaust control programs. The EPA emission factors used in this assessment represent current data based on existing State and Federal air quality legislation. However, the EPA has recently proposed a relaxation of the current and future emission standards up to the year 1980.* Until the relaxation has been approved by Congress, the revised standards should not be used to assess the impacts of increased emissions from mobile sources.

Conclusion

These emissions data are not sufficient by themselves to evaluate the project's impact on air quality. Air quality is assessed by comparing projected concentrations of pollutants with the ambient air quality standards. This is done in the following sections.

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* These revisions to the Clean Air Act are currently being considered in Congress. See "Clean Air Act Amendments," House of Representatives, H.R. 10498.

Table 4

ESTIMATED INCREASE IN EMISSIONS[a] ASSOCIATED WITH GENERATION OF ELECTRICITY

Natural Gas Combustion

Usage Rate = 41,600 ft^3/day[c]

Pollutant	Emission Factor[b] ($lb/10^6$ ft^3)	Total Emissions[d] (tons/day)
Particulate	15.0	.0004
Oxides of sulfur	0.6	.000001
Carbon monoxide	17.0	.0004
Hydrocarbons	1.0	.00002
Oxides of nitrogen	700.0	.014

a. Emissions not located at any one point but distributed throughout the electrical generating network.

b. Environmental Protection Agency, Supplement No. 3 for Compilation of Air Pollutant Emission Factors, Second Edition, p. 1.4-2, July 1974.

c. Derived by considering a usage rate of 3,360 kwh/day, 10,000 Btu required to produce 1 kwh, 1,050 Btu per cubic foot of natural gas and a 30 percent efficiency for power plants.

d. Emission factor x usage rate (41,600 ft^3/day).

Table 5

ESTIMATED INCREASE IN EMISSIONS[a]

ASSOCIATED WITH GENERATION

OF ELECTRICITY

Fuel Oil Combustion

Usage Rate = 277 Gallons per Day[c]

Pollutant	Emission Factor[b] ($lb/10^3$ gal)	Total Emissions[d] (tons/day)
Particulate	0.5	.00006
Oxides of sulfur	5.0	.0006
Carbon monoxide	neg	neg
Hydrocarbons	0.17	.00002
Oxides of nitrogen	2.6	.0003

a. Emissions not located at any one point but distributed throughout the electrical generating network. Both low-sulfur and high-sulfur fuels were considered.

b. Los Angeles County APCD, July 1974. Emissions based on 1973 operation of L. A. County Power Plants. Heating oil assumed to contain 0.5 percent (by weight) of sulfur.

c. Derived by considering usage rate of 3,360 kwh/day, 10,000 Btu required to generate 1 kwh, 1 barrel of fuel oil produces 6.3×10^6 Btu, and a 30 percent efficiency for power plants.

d. Emission factor + Usage rate (277 gal/day).

Table 6

ESTIMATE OF INCREASE IN EMISSIONS

FROM MOBILE SOURCES

Daily Mileage Generated by Project = 11,000[a]

Pollutant	Urban Emission Factor[b] (gm/mi)	Total Emissions (tons/day)
Carbon monoxide	37	.448
Hydrocarbons	4.7	.057
Nitrogen oxides	4.3	.052
Particulates	.58	.007
Oxides of sulfur	.20	.002

a. Reference: Traffic Analysis by Don Goodrich.

b. Environmental Protection Agency, Supplement No. 2 for Compilation of Air Pollutant Emission Factors, Second Edition, p. 3.1.1-6,. September 1973 for year 1977.

c. Emission Factor + Daily Mileage (11,000 miles).

2.4 Local Impact

Assessment of Primary Pollutant Impacts

Automobile usage associated with the parking structure would cause a degradation in local air quality from primary pollutant emissions. In order to assess the emissions effect of the parking structure, the community shown within the study area was mathematically modeled using the same model as was used in modeling existing conditions earlier in this analysis.

Based on 1977 emission factors (adjusted for vehicle speed) the model was used in such a way as to generate "worst-case" meteorological conditions for the peak-hour of automobile travel. The following conditions were assumed for this model:

- o Low wind speed of 2.5 mph.
- o Stable atmosphere, stability class F.
- o Wind angle at small angle to most heavily travelled streets (20° with respect to Embarcadero Freeway).

Cars idling in the facility were considered for the potential impacts they could generate. It was found, however, that the trips were distributed such that no more than 2 cars were expected to be idling in the garage at one time. This is not significant, relative to total automobiles in the study area and therefore only on-street vehicular activity was modelled.

The results of this modelling effort are shown in Figure 4. The results of the model indicate that the highest one-hour averaged carbon monoxide concentration expected within the study area would be 25 PPM, while the California Air Quality Standard is 35 PPM. It should be pointed out that these concentrations are for receptors located directly adjacent to major intersections during the peak traffic hours when congestion is expected to be the heaviest.

Some caution is warranted in the use of these data as absolute Rather, the results should be viewed as indicative. The difficulty here is 1) projecting future emissions or estimating emissions from the existing automobile population and 2) the accuracy of modelling techniques themselves. The EPA emission factors used in this assessment include a

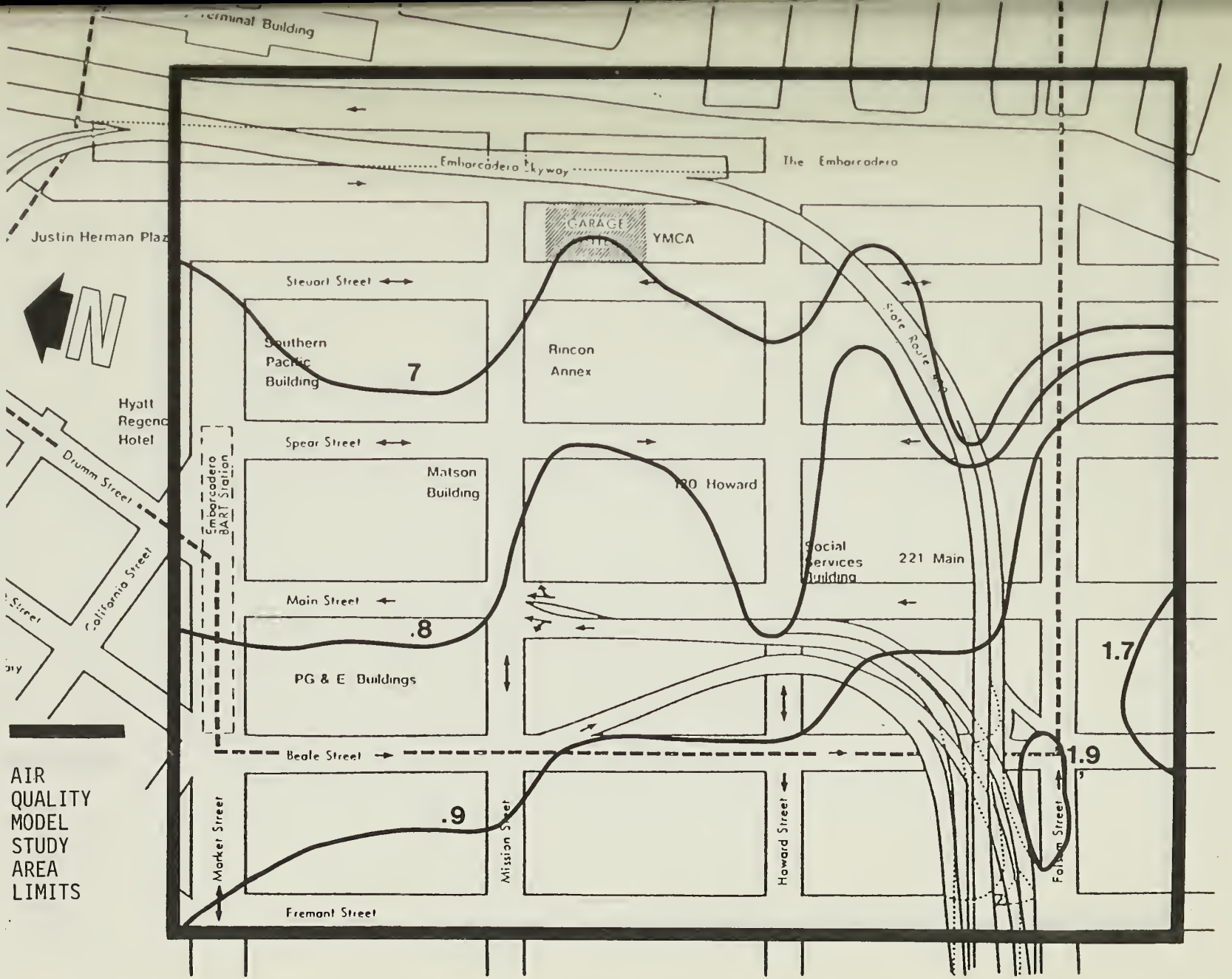

FIGURE 3 NITROGEN OXIDES ISOPLETHS FOR EXISTING WORST-CASE PEAK HOUR CONDITIONS
PEAK HOUR CONDITIONS (PARTS PER MILLION)

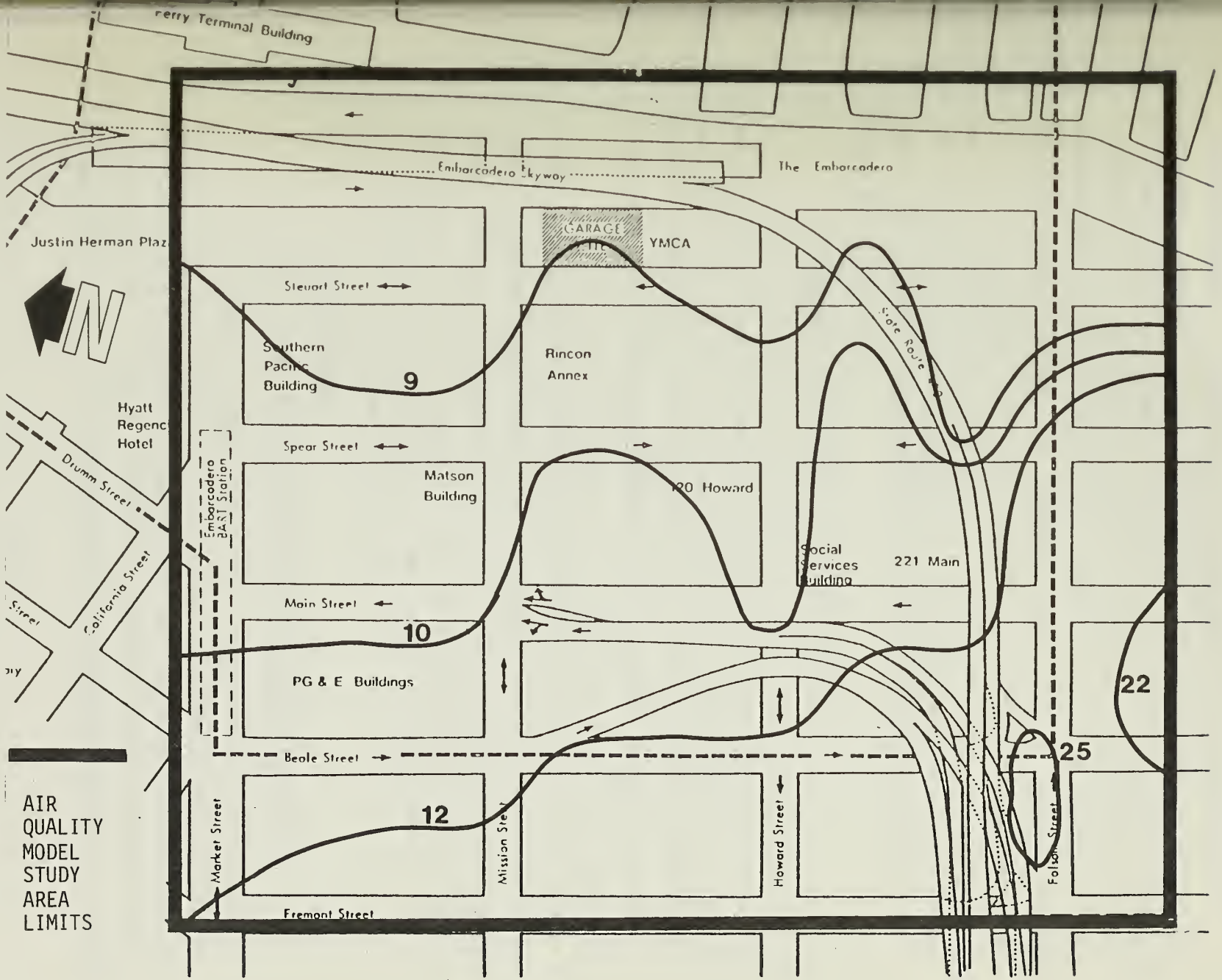

FIGURE 4 CARBON MONOXIDE ISOPLETHS AFTER PROJECT COMPLETION FOR WORST-CASE CONDITIONS (PARTS PER MILLION)

factor for deterioration and represent the best available data from which to project emissions. The effectiveness of the current emissions control program will depend upon the successful development of the necessary controls, consumer maintenance, reliability,and durability of the controls and enforcement. Whether the increasing automobile population actually offsets the emission control program will be determined by the effectiveness of the current control program, as well as additional, more stringent control programs in subsequent years. The EPA emission factors used in this assessment include a factor for deterioration and represent the best available data from which to project emissions. With respect to the acurracy of mathematical models of pollutant dispersion, validation tests of such models show modelled to actual conditions differences as great as a factor of 2.

Assessment of Secondary Pollutant Impacts

Possible paths responsible for the formation of oxidant observed in the project area were previously discussed in the existing air quality section of this report. In assessing oxidant, the assumption is adopted that an increase in primary pollutant emissions of reactive hydrocarbons and oxides of nitrogen would produce a proportionate increase in oxidant.

Since oxidant formation is a function of time, only automobile traffic generated upwind would have an effect on local on-site oxidant levels. Further, only morning generated pollutants would contribute to local oxidant levels. As previously discussed, oxidant experienced in the downtown area is very low. Therefore, project generated pollutants would only increase oxidant levels downwind of the project and would result in very small oxidant changes near the facility.

2.5 Regional Impact

Impact of Secondary Pollutants on Regional Air Quality

The proposed project would have a regional impact on oxidant levels due to the additional vehicle miles generated by the project and the concomit would increase in hydrocarbon and oxides of nitrogen emissions. These emissions of primary pollutants, especially during the May through October smog season, likely would produce a subsequent increase in secondary

pollutants, including oxidant. The number of vehicles associated with the project are a small percentage of the number of cars operating in the Bay Area, indicating that the impact of the proposed project upon regional oxidant levels would be small. The cumulative effect of many similar projects is not small and should be considered on a regional planning level.

2.6 Summary and Assessment

The automobile is the dominant source of pollutants associated with the project. The project would increase the levels of primary and secondary pollutants regionally and locally, resulting in general degradation in air quality. However, because of prevailing wind conditions, the pollutants generated would be dispersed and would not be expected to create areas of excessive pollutant concentration locally or regionally. High concentrations of CO may be experienced within 50 feet of highways and should not present a problem.

A word of caution is warranted, however. The cumulative impact of many projects in an area may be significant. The summation of many small impacts may produce, insofar as air quality is concerned, a large impact due to the fact that each development increases the use of the automobile, the major source of pollutant emissions in the Bay Area. In the case of this project, it is located in an area where studies show that a parking deficiency exists (DeLeuw, Cather and Company, 1975; Goodrich, 1976). In such areas, in the opinion of the consultant, it is possible that the project may reduce vehicle miles traveled over the long run by reducing the search time of motorists who are seeking parking spaces. The extent of this reduction, if any, would be dependent on variations in the deficiency ratio and is therefore difficult to quantify.